THE
SOUTHWORTH-STONE
ARITHMETIC

BOOK I

BENJ. H. SANBORN & C
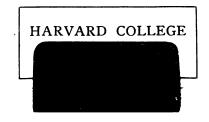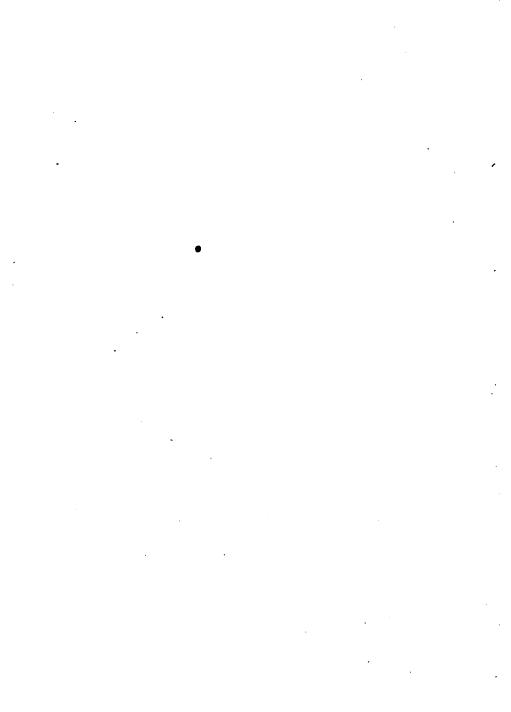
THE

SOUTHWORTH-STONE ARITHMETIC

A RATIONAL METHOD

BOOK I. FOR LOWER GRADES

GORDON A. SOUTHWORTH
SUPERINTENDENT OF SCHOOLS, SOMERVILLE, MASS.

AND

JOHN C. STONE, A.M.
ASSOCIATE PROFESSOR OF MATHEMATICS, STATE NORMAL COLLEGE,
YPSILANTI, MICHIGAN

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THE
SOUTHWORTH–STONE ARITHMETIC.

BOOK I. PRIMARY.
BOOK II. INTERMEDIATE.
BOOK III. ADVANCED.

WITH OR WITHOUT ANSWERS.

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PREFACE

"The Southworth-Stone Arithmetic" is a graded series of three Books each separated into two Parts. The series is designed to cover the work of all the elementary grades in which a text-book is commonly used, beginning with the third-year grade and ending with the last year below the high school.

The books have been prepared not by theorists to exploit their peculiar notions, but by teachers of long and successful experience. They follow the order of subjects and the lines of development established by the highest educational authorities.

No attempt has been made to follow the so-called "spiral plan," now decadent; each grade, however, thoroughly reviews and carries forward the work of the preceding grades, new topics being introduced in order to stimulate the interest of the student and to develop his power.

In the presentation of subjects the inductive method has been employed throughout in a way that calls for study and effort and secures that mathematical training that never comes by mechanical figuring and imitation. This logical development of subjects differentiates the series from mere books of problems.

To secure skill and proficiency in the more important subjects, abundant exercises for drill and practice have been provided. A profusion of oral and written problems is given in about equal proportion. The number to be used must depend upon the need of the student. It will be found that fewer problems carefully solved and logically analyzed will be more valuable than many mechanically performed.

Many subjects heretofore treated in arithmetics have been omitted as non-essential or beyond the legitimate work of the ele-

mentary schools. Enough has been given, however, to meet the demands of business and to furnish the requisite mental discipline.

The methods employed in all the books of the series have been tested in manuscript in the model or training classes in the State Normal College at Ypsilanti, Michigan. The authors acknowledge their indebtedness to Miss Abigail Roe and Miss Mary Steagall and other teachers in that institution for valuable suggestions growing out of such tests. Especial thanks are due to President L. H. Jones of the College, for his counsel as the work has progressed and for his aid in making the books worthy of adoption and use.

This **First Book** of "The Southworth-Stone" Series is designed for the use of third and fourth year pupils in graded schools. It is arranged in two parts.

Part I assumes that pupils have had oral instruction and blackboard exercises during their second year, and that they are familiar with combinations and separations of numbers to twenty. Oral and written exercises in addition and subtraction are first given; the multiplication and division tables are developed and taught as inverse operations; numerous exercises, both oral and written, are given in the fundamental processes; drill tables are furnished; simple fractions are introduced; denominate numbers are taught; and an abundance of problems and review exercises supplied.

Part II reviews and extends these subjects with rather more difficult exercises. The measurement of rectangular surfaces and solids is introduced and also simple decimals. Exercises in great variety abound, and diagrams are used when helpful.

CONTENTS

NOTE. — In this table of contents italics are used to indicate work in which the emphasis is placed on review, practice, drill, and test of power.

Small capitals indicate subjects whose introduction in the particular connection in which they appear is in part explained by their being good material for practice in processes just learned.

Parentheses are used to indicate coördinated or correlated subjects, or to show the purpose of the work covered by the main title.

PART I. — THIRD GRADE

PART II. — FOURTH GRADE

THE

SOUTHWORTH-STONE ARITHMETIC

FIRST BOOK

PART I

WRITING NUMBERS

1. How many days has a week?

2. How many cents in a dime?

3. How many stripes in our flag?

In answering these questions we have used **numbers** *seven, ten, thirteen.* **Numbers** are used to show *how many.*

4. Name the numbers from *one* to *nine* by counting.

Figures stand for numbers. The first nine are: —

one	*two*	*three*	*four*	*five*	*six*	*seven*	*eight*	*nine*
1	2	3	4	5	6	7	8	9

The **tenth figure, 0,** is called **zero,** and stands for *not any* or *nothing.*

5. Count from *ten* to *twenty.* **Ten** is written 10; **eleven,** 11.

The figure in the right-hand place stands for **ones,** *and in the next place at the left for* **tens.**

Thus 10 means 1 *ten* and not any *one.* 11 means 1 *ten* and 1 *one.*

6. Write in figures: twelve, thirteen, fourteen to twenty.

1

1. Count from *twenty* to *one hundred*.

2. Twenty means *two tens*. Thirty means *three tens*. What does forty mean ? What does fifty mean ?

3. **30** stands for thirty. It means 3 *tens* and no *ones*. Write forty.

4. Write fifty, sixty, seventy, eighty, and ninety.

5. Forty-six means 4 *tens* and 6 *ones*, and is written 46. Write fifty-three in figures.

6. *Read the following numbers :* —

24	84	17	63	53	18	42
36	27	73	48	90	39	85
19	63	27	27	79	91	55

7. *Write in figures the following numbers :* —

Twenty-five	Thirty-seven	Forty-two
Ninety-six	Eighty-four	Seventy-five
Sixty-eight	Fifty-seven	Nineteen

ADDITION

1. How many cents will it take to buy a five-cent top and a two-cent marble ?

2. Harry has five large fire-crackers and four small ones. How many fire-crackers has he ?

3. If I put four books and five books together, how many books shall I have in all ?

4. James had 3 cents in his bank and put in 5 cents more. How many had he in the bank then ?

1. I have 5 apples in a basket and add 4 more. How many have I then in the basket?

2. James has 6 pencils in a box and adds 4 more. How many then in the box?

3. Put 5 eggs into a basket containing 6 eggs and it will contain how many?

Putting two or more numbers together to find their sum is **addition**.

Add at sight: —

4.	3	6	2	5	8	5	3	7	4
	5	4	7	4	1	5	6	3	4

5.	6	5	9	2	0	1	7	3	2
	2	3	1	8	8	6	0	4	5

6.	7	4	6	8	9	2	4	3	4
	1	7	5	3	0	9	8	9	2

The **sign of addition** is $+$, named *plus*. It is generally read *and*. The **sign of equality** is $=$. It may be read *are*. The **dollar sign** is $. $8 + $3 = 11, is read 8 dollars *and* 3 dollars *are* 11 dollars.

7. 9 cents + 2 cents = ——. 10. 6 men + 3 men = ——.

8. 8 eggs + 2 eggs = ——. 11. 4 books + 8 books = ——.

9. 7 sheep + 4 sheep = ——. 12. 3 ducks + 5 ducks = ——.

13. Make a problem about $2 + 6 =$ ——.

14. Make a problem about $4 + 7 =$ ——.

15. Make a problem about $6 + 8 =$ ——.

1. If I put 4 books and 3 books together, I shall have —— books.

2. When I add 5 pencils to 6 pencils, I shall have —— pencils.

3. James put 3 cents, 5 cents, and 2 cents into his bank, and then it contained —— cents.

4. The next day he added 4 cents and 2 cents, and then his bank had —— cents in it.

5. Seven apples and 8 apples are —— apples.

6. Eight slates added to 6 slates make —— slates.

7. Put 5 eggs and 7 eggs into the basket together, and then it will contain —— eggs, or just a ——.

8. Eight boys and 5 boys are —— boys, and if 3 boys join them, there will be —— boys.

9. By putting 9 things and 4 things together we get —— things.

10. Add 5 pencils to 8 pencils, and the sum is —— pencils.

11. What is the sum of 4 cents and 10 cents? How do you find it?

12. 7 cents + 8 cents = ——.

13. 9 pounds + 6 pounds = ——.

14. 7 leaves + 9 leaves = ——.   15. $8 + 4 + 2 =$ ——.

Fill the blanks below with any numbers less than 10 : —

16. I went to a store and spent —— cents for a book, —— cents for a slate, and —— cents for a pencil. By adding these numbers I find that I spent in all —— cents.

1. There were 12 oranges in one basket and 14 in another. How many in both?

WORK

12 oranges
14 oranges
——
26 oranges

EXPLANATION. — It is convenient to write the *ones* of the second number under the *ones* of the first, and the *tens* under the *tens*. 2 *ones* and 4 *ones* are 6 *ones*, and we write it under the *ones* above. 1 *ten* and 1 *ten* are 2 *tens*, and we write it under the *tens* above.

2. Charles has 23 marbles and James has 14. How many have both?

3. There are 16 cows in one field and 21 in another. How many cows in both fields?

4. Mary paid 25 cents for a doll and 12 cents for some ribbon. How much did she spend in all?

5. A farmer got 23 eggs one day and 34 the next. How many did he get in both days?

6. 43	**7.** 16	**8.** 19	**9.** 17	**10.** 24
+ 24	+ 42	+ 60	+ 42	+ 71
11. 22	**12.** 43	**13.** 81	**14.** 63	**15.** 12
+ 74	+ 26	+ 17	+ 25	+ 76

16. There are 38 sheep in one field and 41 in another. How many in both fields?

17. My book cost 32 cents and my slate cost 16 cents. Both cost how many cents?

18. If I pay 20 cents for a ball and 25 cents for a catching glove, what do I pay for both?

NOTE. — This table contains all the primary combinations in addition, and should be used until the pupil is perfectly familiar with them. Amounts may be given by columns or by lines.

	A	*B*	*C*	*D*	*E*	*F*
1.	$2+8$	$5+2$	$2+6$	$8+7$	$1+7$	$2+5$
2.	$6+3$	$2+2$	$8+1$	$7+1$	$5+8$	$7+3$
3.	$9+1$	$8+6$	$6+4$	$2+3$	$5+9$	$7+4$
4.	$4+4$	$9+8$	$9+2$	$4+3$	$1+4$	$6+5$
5.	$2+7$	$8+9$	$6+8$	$5+7$	$1+1$	$2+1$
6.	$8+2$	$9+6$	$1+9$	$3+1$	$9+3$	$7+2$
7.	$3+5$	$3+9$	$1+3$	$6+2$	$7+9$	$0+6$
8.	$4+7$	$9+9$	$5+5$	$7+6$	$3+7$	$1+5$
9.	$4+1$	$6+9$	$2+4$	$8+8$	$5+4$	$8+4$
10.	$3+3$	$4+2$	$6+1$	$4+6$	$9+7$	$1+6$
11.	$3+6$	$9+5$	$5+3$	$4+9$	$9+4$	$8+0$
12.	$2+9$	$8+5$	$5+6$	$7+8$	$3+2$	$5+1$
13.	$7+5$	$6+6$	$7+7$	$1+8$	$3+4$	$7+0$
14.	$8+3$	$4+8$	$6+7$	$3+8$	$4+5$	$1+2$

1. $3+$	**2.** $2+$	**3.** $5+$	**4.** $3+$	**5.** $4+$	**6.** $5+$
5	3	3	2	3	6
4	4	4	6	3	4
6	2	3	5	7	6
2	3	2	8	4	3

In adding, do not count, but say in example 1: 2, 8, 12, 17, 20. Add up the column from the bottom, then down from the top. The results should be alike.

1. 25+	2. 26+	3. 20+	4. 16+	5. 32+	6. 42+
30	41	17	61	43	21
13	30	42	12	12	14

7. 41+	8. 22+	9. 10+	10. 21+	11. 32+	12. 21+
12	41	21	42	40	31
23	14	35	15	13	43
13	12	12	11	14	2

13. Harry has 13 cents in one pocket, 42 in another, and 31 cents in a little bank. How much money has he?

14. James set three hens. One hatched 13 chickens, another 12, and the other 10. How many did the three hens hatch?

15. Daniel spent 25 cents for a catching glove, 12 cents for a bat, and 30 cents for a ball. What did he pay for all?

16. Lucy has a little tea set consisting of 12 plates, 12 cups, 12 saucers, and 3 other dishes. How many pieces in the set?

17. I spent 40 cents for a pound of tea, 32 cents for a pound of coffee, and 15 cents for a piece of steak. What was the cost of all?

18. A boy sold 23 papers one day, 32 the next, and 43 the next. How many did he sell in the three days?

19. Henry picked 32 quarts of berries on Monday, 36 on Tuesday, and 31 on Wednesday. How many quarts did he pick in the three days?

1. If I have 8 cents in my purse and take out 5 cents, there will be left —— cents.

2. In a basket there are 12 eggs. I take out 7, and —— eggs remain in the basket.

3. On the shelf there are 14 books. Mary takes away 5 of them, and —— remain.

4. Ellen has 7 roses; two of them are white, and the remainder are red. How many are red?

5. Charles had 20 cents, but spent 12 cents for a book. Then he had —— cents remaining.

6. If 10 is one part of 17, the other part must be ——.

Taking a part of a number out of it to find the remainder is **subtraction.**

7. Take 4 pencils out of a bunch of 12, and the remainder is —— pencils.

8. Edward had 19 marbles, and James had 14. Edward had —— more than James.

We use subtraction in finding the **difference** *between two numbers:* The **sign of subtraction,** −, is called *less.*

The sign ¢ stands for *cents.* Thus: —
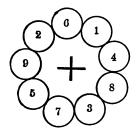
15 ¢ − 12 ¢ = 3 ¢, is read 15 cents *less* 12 cents are 3 cents.

From each number subtract the one below it : —

9. 19	24	21	16	50	60
5	11	9	13	10	20

10. 18	15	17	12	40	70
4	12	8	6	20	30

NOTE. — This table contains all the primary subtractions, and should be used until the pupil is proficient. Results may be given by columns or by lines.

	A	B	C	D	E
1.	1 from 2	2 from 11	5 from 9	7 from 13	1 from 3
2.	1 from 8	8 from 13	3 from 7	9 from 10	2 from 2
3.	1 from 6	6 from 12	5 from 7	8 from 15	4 from 9
4.	1 from 1	8 from 18	2 from 4	5 from 14	8 from 9
5.	6 from 9	3 from 10	3 from 6	6 from 11	5 from 6
6.	2 from 9	9 from 14	1 from 4	9 from 15	7 from 11
7.	2 from 6	8 from 11	4 from 8	9 from 16	7 from 15
8.	2 from 5	3 from 12	4 from 5	2 from 10	5 from 10
9.	6 from 7	9 from 17	1 from 9	8 from 14	7 from 12
10.	6 from 6	5 from 11	5 from 8	4 from 13	7 from 10
11.	2 from 3	1 from 10	2 from 7	8 from 12	8 from 17
12.	4 from 4	9 from 12	3 from 3	4 from 10	9 from 20
13.	3 from 4	5 from 13	3 from 9	9 from 13	7 from 20
14.	7 from 7	7 from 16	7 from 8	3 from 11	8 from 20
15.	3 from 5	6 from 15	4 from 7	8 from 16	1 from 20
16.	1 from 5	8 from 10	8 from 8	9 from 18	5 from 20
17.	1 from 7	5 from 12	3 from 8	4 from 12	4 from 20
18.	5 from 6	4 from 11	2 from 2	9 from 11	6 from 20
19.	1 from 3	6 from 14	4 from 9	7 from 14	3 from 20
20.	8 from 9	6 from 13	9 from 9	6 from 10	2 from 20

$$\begin{array}{cccccc} 19 & 23 & 46 & 24 & 35 & 27 \\ -7 & -8 & -9 & -7 & -8 & -9 \\ \hline \end{array}$$
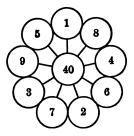
Begin with any number and add in either direction until the sum exceeds 60. Give results only, thus: 1, 5, 13, 16, 23, etc., or 1, 7, 9, 18, etc.

Give the sums quickly: —

1.	2.	3.	4.	5.	6.	7.
23	14	13	26	43	36	43
8	6	9	7	5	5	8

8. Beginning with any circle, subtract the numbers in the circles successively from 40. Thus, beginning at 1, we say 40 less 1 is 39; 39 less 8 is 31, and so on; give *results* only, as, 39, 31, 27, etc.

9. Put any other number in the center as your teacher may direct.

From each number subtract the one below it: —

10.	11.	12.	13.	14.	15.	16.
39	22	34	31	26	43	40
8	7	6	9	3	8	8

17.	18.	19.	20.	21.	22.	23.
20	30	60	40	60	70	80
8	9	7	5	9	7	9

1. 9 cents + —— cents = 15 cents.   2. $18 = 9 +$ ——.
3. Add 6, 4, 9 and 3.   4. 7 out of a dozen leaves ——.
5. $20 - 9 + 4 =$ ——.   6. Count by 2's from 2 to 20.
7. How many out of 16 chickens died if only 7 lived?
8. $24 - 4 - 5 - 6 =$ ——.
9. Count backward by 3's from 20.

10. *Give quickly the sum and difference:* —

6	10	12	18	6	10	12	23	41	20	16
8	9	5	4	17	20	10	9	6	20	9

11. If Mary loses 16 cents of the 25 her mother gave her, how many will she have left?

12. Put 4, 6, 9, 8, and 5 together as one number.

13. Subtract 13 from 22, and what have you left?

14. James has 13 cents. How much more must he earn to have 25 cents?

15. One part of 23 is 9. What is the other part?

16. Emma has 19 cents; her mother gave her enough more to make 26 cents. How much did she give her?

17. *Add 5 to each of these numbers:* —
31, 29, 60, 32, 17, 95, 37, 86, 51, 22, 19.

18. $42 = 11$ and ——.   19. $100 + 20 + 5 =$ ——.

20. April has 30 days. After 7 have gone there are —— more to come.

21. I bought berries for 10 ¢, and an orange for 4 ¢. I gave the merchant 25 ¢. How much did he return to me?

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
4+	6+	8+	9+	4+	7+	8+	6+	7+	9+
6	2	4	6	7	8	4	5	3	8
9	9	9	6	6	9	2	5	6	9
8	7	5	5	8	8	9	4	4	8
3	3	2	10	9	10	7	3	9	9

11.	12.	13.	14.	15.	16.	17.	18.	19.
25	87	92	100	64	85	50	300	200
−6	−4	−7	−9	−21	−43	−30	−100	−80

Add :—

20.	21.	22.	23.	24.	25.	26.	27.	28.
32	16	32	93	63	30	400	31	60
45	22	47	16	91	70	200	102	147

---

1. Add 7, 6, 5, 4, 9, 2, and take away 8.

2. Add 32, 14, 20, 30, and subtract 9.

3. A farmer dug 98 bushels of potatoes. He sold 75 bushels. How many bushels did he keep?

4. One basket contains 72 apples, and another contains 23. If you empty both baskets into a barrel, how many apples will it contain?

5. Take $4 + 7 + 8 + 9 + 2$ away from $17 + 4 + 10$.

6. On one side of George's slate there are 32 words, and on the other side 26 words. If he erases 6 words from one side, and 8 from the other, how many words remain on his slate?

1. In writing numbers we use —— figures.

2. The names of the ten figures are ——.

3. The largest number that can be written with one figure is ——.

4. To write numbers larger than nine we use —— or more —— placed side by side.

A figure used alone or in the *first* right-hand place stands for so many **ones**; as, 3 = 3 ones.

A figure in the *second* place stands for **tens**.

30 = 3 tens; 33 = 3 tens + 3 ones.

A figure in the *third* place stands for **hundreds**.

300 = 3 hundreds; 333 = 3 hundreds + 3 tens + 3 ones.

A figure in the *fourth* place stands for **thousands**.

3000 = 3 thousands; 3 thousands + 3 hundreds + 3 tens + 3 ones = 3333.

3546 = 3 thousands + 5 hundreds + 4 tens + 6 ones, and is read 3 thousand 5 hundred forty-six.

Do not use **and** *in reading whole numbers.*

5. *Tell what the separate figures stand for in :* —

62	84	964	8391	1648	5840
85	96	327	4672	4476	1600
119	234	426	6893	5908	2803

6. Read each of the numbers given above.

Write in figures : —

7. Five thousand, three hundred fifty-six.

8. One thousand, three hundred thirty-eight.

9. Nine thousand, five hundred eighty-one.

$$10 \quad \text{ones} \quad = 1 \quad \text{ten} \quad = \quad 10$$
$$10 \quad \text{tens} \quad = 1 \quad \text{hundred} = \quad 100$$
$$10 \quad \text{hundreds} = 1 \quad \text{thousand} = 1000$$

To TEACHERS. — The relation of ones, tens, hundreds, and thousands can be shown objectively by bundling toothpicks or splints.

1. 10 ones = 1 ——; 10 tens = 1 ——; 10 hundreds = 1 ——.

2. $37 = 3$ tens + 7 ones; $287 = $ —— + —— + ——; $84 = 7$ tens + 14 ones.

3. $26 = $ —— + ——; $354 = $ —— + —— + ——; $93 = 8$ tens + ——.

4. $75 = $ —— + ——; $659 = $ —— + —— + ——; $65 = 5$ tens + ——.

5. How many *ones* equal one *ten?* How many tens = 1 hundred ?

6. In 29 how many tens and ones ? In 37 ? 49 ?

7. In 340 how many hundreds and tens ? In 260 ?

8. $18 + 4 + 7 = $ —— tens + —— ones. $9 + 6 + 7 + 8 = $ —— + ——.

9. $30 + 60 + 50 = 140 = $ —— hundred + —— tens.

Copy and add by columns and by lines: —

| 1. | 2. | 3. | 4. | 5. | | 6. | 7. | 8. | 9. | 10. |

11. $1 + 2 + 3 + 1 + 3 = $ ——.   **16.** $2 + 3 + 2 + 3 + 4 = $ ——.

12. $2 + 2 + 3 + 2 + 3 = $ ——.   **17.** $4 + 3 + 3 + 2 + 3 = $ ——.

13. $3 + 3 + 2 + 3 + 3 = $ ——.   **18.** $6 + 9 + 3 + 2 + 3 = $ ——.

14. $2 + 1 + 3 + 3 + 2 = $ ——.   **19.** $2 + 3 + 1 + 3 + 2 = $ ——.

15. $2 + 3 + 1 + 1 + 2 = $ ——.   **20.** $2 + 3 + 3 + 2 + 3 = $ ——.

1. Add 357, 864, and 928.

WORK

357
864
928
―――
2149

EXPLANATION.—1. Which figures represent *ones?*

2. 7 ones + 4 ones + 8 ones = —— ones. 19 ones = —— ten and —— ones. *Write the 9 ones in ones' column.*

3. 1 ten (from the sum of ones' column) + 5 tens + 6 tens + 2 tens = —— tens. 14 tens = —— hundred + —— tens. *Write the 4 tens in tens' column.* 1 hundred (from tens' column) + 3 hundreds + 8 hundreds + 9 hundreds = —— hundreds. *Write the 21 hundreds in hundreds' columns.* The sum is 2149.

To test our work we should add both downward and upward.

Add and test :—

2. 36	**3.** 72	**4.** 86	**5.** 96	**6.** 76	**7.** 94
48	49	97	88	89	76

8. 42	**9.** 73	**10.** 82	**11.** 94	**12.** 86	**13.** 76
79	86	37	43	63	94
43	44	65	68	96	74

14. 134	**15.** 784	**16.** 828	**17.** 723	**18.** 673
628	362	316	261	247
731	734	251	245	356

19. 892	**20.** 273	**21.** 523	**22.** 345	**23.** 426
136	824	621	678	291
784	317	378	124	478
625	621	243	639	324
547	832	276	217	555

Add downward and test by adding upward : —

1.	2.	3.	4.	5.	6.
247	325	833	642	839	641
329	476	307	893	984	376
408	307	476	614	845	684
629	614	325	472	371	988

7.	8.	9.	10.	11.	12.
329	649	832	964	821	832
921	468	327	96	827	375
932	583	673	230	14	6
847	891	39	846	218	94

Written Problems

1. A man bought a horse for $ 325, a carriage for $ 275, and a harness for $ 62. What did they all cost?

2. A man's farm consists of 85 acres of woodland, 87 acres of pasture, 150 acres of corn, and 123 acres of other grains. How many acres in the farm?

3. A farmer raised the following grains : 395 bushels of corn, 976 bushels of oats, and 1564 bushels of wheat. How many bushels of grain did he raise?

4. A trader deposited $ 625 in his bank on Monday, $ 396 on Tuesday, $ 497 on Wednesday, $ 6 on Thursday, $ 227 on Friday, $ 396 on Saturday. How much did he deposit during the entire week?

The smallest coin that we use is the **cent**.

A nickel =	5 cents.	A quarter of a dollar = 25 cents.
A dime =	10 cents.	A half-dollar	= 50 cents.
A dollar =	100 cents.	$ means *dollars;* ¢ means *cents.*

When we write dollars and cents together, we put a *period* called a **decimal point** between them. Thus: —

$3.25 is read 3 dollars and 25 cents.

1. Read: $1.25; $1.50; $2.75; $3.24; $4.50; $6.95; $0.75; $0.68.

2. 2 nickels = —— cents; 15 cents = —— nickels.

3. 2 dimes = —— cents, or —— nickels; $1 = —— quarters.

4. 1 dime + 2 nickels = —— cents; 3 dimes = —— cents.

5. Sarah gave the grocer 2 dimes to pay for 12 cents' worth of sugar; he gave her back —— cents.

6. 1 dime + 3 nickels = —— cents, or —— nickels.

7. The three coins that make 25¢ are 2 —— and a ——.

8. When I pay for 17 cents' worth of salt with a silver quarter, I should receive —— back in change.

9. How many silver quarters would you give for a half-dollar?

10. Out of a quarter take a dime and a nickel. What is left?

11.	$2.25	$1.12	$5.00	$3.75	$1.10	$6.50
	+2.00	+2.14	+5.00	−1.15	+1.15	−6.50

1. One part of 16 is 5 and the other part is ——.

2. 7 and —— = 13; 13 − —— = 6; 26 − 5 = —— ;
400 = 100 + ——.

3. Taking part of a number out of it to find the remainder is ——.

The number from which a part is taken in subtraction is the **minuend**. The part taken away is the **subtrahend**, and the part left is the **remainder**. Of course the two parts put together make the minuend. Thus : —

Minuend — Subtrahend = Remainder

15	−	9	=	6
15	=	9	+	6
25	−	12	=	13
25	=	12	+	13

$378 = $ minuend.
$132 = $ subtrahend.
$\overline{246} = $ remainder.
$132 + 246 = 378.$

Written

4. One part of 898 is 624 ; find the other part ; prove it.

5. The whole of my money = $800 ; one part of it = $200 ; the rest = ——.

6. Minuend = 456 ; subtrahend = 223 ; remainder = ?

7. Subtract 37 from 93.

$$93 = 80 + 13 \qquad 93$$
$$37 = 30 + \ 7 \qquad 37$$
$$\overline{56 = 50 + \ 6} \qquad \overline{56}$$

METHOD. — As 7 ones cannot be taken from 3 ones, we change one of the 9 tens to 10 ones, and put it with the 3 ones; 7 ones from 13 ones = 6 ones. After taking the 1 ten from the 9 tens, 8 tens were left; 3 tens from 8 tens = 5 tens. The remainder is 5 tens + 6 ones, or 56.

NOTE. — The teacher should make the process clear by using splints tied in 10's, and from 9 tens and 3 take 3 tens and 7.

From	Take		From	Take		From	Take
1. 182	68		5. 382	176		9. 864	358
2. 281	75		6. 476	218		10. 327	119
3. 322	119		7. 694	486		11. 630	525
4. 461	253		8. 783	666		12. 741	33

13. A gentleman who had $692 gave away $279. How much had he left?

14. A man having $936 spent $495 for a house lot. How much had he remaining?

15. America was discovered in 1492 A.D.; the Pilgrims landed at Plymouth in 1620 A.D. How many years from the discovery of America until the landing of the Pilgrims?

16. Having 387 miles to travel, I went 262 the first week. How many miles remained for me to travel?

17. A farmer had a crop of 385 bushels of potatoes. He sold 168 bushels. How many bushels remained?

18. There are 792 oranges in two boxes. If there are 376 in one, how many in the other?

19. A man paid $650 for a fine pair of carriage horses and $385 for a carriage. How much more did the horses cost than the carriage?

20. A farmer raised 150 bushels of apples. How many bushels will he have after selling 87 bushels?

21. There are 96 pupils in the first three grades. If there are 35 in the first grade, and 38 in the second, how many are there in the third?

1. What will 2 two-cent stamps cost?

2. What will 3 two-cent pencils cost?

3. $2 + 2$ or two 2's are ——. $2 + 2 + 2$ or three 2's = ?

4. There are two pints in a quart. How many pints in 4 quarts?

5. Four 2's are generally called 4 times 2.

The sign (×) stands for the word times.

6. $2 \times 2 =$ ——. $3 \times 2 =$ ——. $4 \times 2 =$ ——.

●● ●● ●● ●● ●● ●● ●● ●● ●● ●●

7. Count these dots by 2's, as 2, 4, 6, etc.

8. 4 times two dots are how many dots?

9. Four girls each gave a blind beggar 2 cents; together they gave him —— cents, for 4 twos are ——.

10. Each of five boys earned $\$2$ in one week, together they earned ——. $5 \times \$2 =$ ——.

Combining equal numbers into one number is **multiplication.**

The result of a multiplication is a **product.**

11. Six 2's, or 6×2, are how many? We find by adding that six 2's are 12. We must learn and remember this fact so that we can always tell that six 2's are 12 without stopping to add.
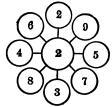
Find these products by adding, and then learn them.

$3 \times 2 =$ ——.	$6 \times 2 =$ ——.	$9 \times 2 =$ ——.
$4 \times 2 =$ ——.	$7 \times 2 =$ ——.	$10 \times 2 =$ ——.
$5 \times 2 =$ ——.	$8 \times 2 =$ ——.	

Drill Exercise.

Beginning with any number, multiply each number by 2 going around the circle in either direction.

Give results rapidly.

1. 2×5 ones = —— ones. 2×6 tens = —— tens.
2. 2×3 feet = —— feet. 2×4 pints = —— pints.

Written

3. Find the product of 2×32.

WORK

$\begin{array}{r} 32 \\ 2 \\ \hline 64 \end{array}$

EXPLANATION. — $32 = 3$ *tens* $+ 2$ *ones.*

2×2 *ones* $= 4$ *ones*, and the 4 is written in *ones'* column.

2×3 *tens* $= 6$ *tens*, and 6 is written in *tens'* column, and the product is 64.

In this way find the product of : —

4.	5.	6.	7.	8.	9.	10.	11.
42	63	84	71	11	12	13	54
2	2	2	2	2	2	2	2

12.	13.	14.	15.	16.	17.	18.	19.
83	74	64	31	33	44	83	52
2	2	2	2	2	2	2	2

20. I bought 2 oranges at —— cents each. The two cost —— cents for $2 \times$ —— = ——. (Fill the first *blank* with any number less than 10.)

1. I have 6 oranges. If I should divide them equally between two girls, how many will each receive?

2. One half of 6 oranges is —— oranges.

One half is written $\frac{1}{2}$.

3. James had 8 pears but gave Harry $\frac{1}{2}$ of them. How many did each have?

4. 3 is one half of what number?

5. 4 is $\frac{1}{2}$ of ——. 5 is $\frac{1}{2}$ of what?

6. In a basket are 12 eggs. How many times can I take 2 eggs out? How many 2's in 12; that is, how many 2's will make 12?

7. Take 16 objects. Arrange them in pairs of two each. How many 2's in 16?

8. In the same way, find how many 2's in 18. In 20.

9. $\frac{1}{2}$ of 12 = ——. $\frac{1}{2}$ of 14 = ——. $\frac{1}{2}$ of 16 = ——. $\frac{1}{2}$ of 18 = ——.

Separating a number into equal parts is **division.**
The result of a division is a **quotient.** Thus: —
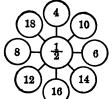
Separating $16 into 2 equal parts is finding $\frac{1}{2}$ of $16, or dividing $16 by 2. The *quotient* of $16 divided by 2 is $8.

The **sign of division** is ÷; it means *divided by.*

10. $14 ÷ 2 = $——; $8 ÷ 2 = $——; $\frac{1}{2}$ of 12¢ is ——¢; $\frac{1}{2}$ of $20 is $——.

11. Count by 2's from 2 to 20, forward and back. In doing so you will give ten **multiples** of 2.

1. Give the first ten *multiples* of 2. See exercise 11 on the preceding page.

2. *Give ½ of each of the following :* —
20; 40; 60; 80; 100; 120; 140; 160; 180; 200.

3. 2 in 7, 3 times and a remainder of 1. 2 in 9, 4 times and a remainder of 1. What is 2 in 11? 2 in 13? 2 in 15?

Give results rapidly.

4. *Give the quotients and remainders :* —

| 2)12 | 2)13 | 2)18 | 2)19 | 2)17 | 2)21 | 2)24 | 2)25 |

5.	**6.**	**7.**	**8.**	**9.**	**10.**	**11.**
21+	21	32+	32	43+	43	52
21	×2	32	×2	43	×2	×2

12. Divide 46 by 2.

WORK

2)46
23
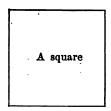
EXPLANATION. — ½ of 4 tens = 2 tens. The 2 is written under the 4. ½ of 6 is 3, and the 3 is written under 6. The quotient is 23.

13.	**14.**	**15.**	**16.**	**17.**	**18.**	**19.**
44+	2)88	31+	2)62	63+	2)126	2)148
44		31		63		

20. How many 2-cent oranges can you buy for 10 cents?

21. How many 2-cent pencils for 14 cents?

22. How many 2-cent writing tablets for 18 cents?

23. I divided 20 oranges into two equal lots, putting —— in each lot.

●●●   ●●●   ●●●   ●●●   ●●●   ●●●   ●●●

1. 2 threes are how many? $2 \times 3 =$ ——.

2. 3 threes are ——. $3 \times 3 =$ ——.

3. $3 + 3 + 3 + 3 =$ ——. $4 \times 3 =$ ——.

4. Five groups of dots of three each are —— dots. $5 \times 3 =$ ——.

5. Three groups of 5 each are ——. $5 \times 3 =$ ——. $3 \times 5 =$ ——.

6. Put 6 times 3 eggs into a basket and there will be —— eggs in the basket.

7. One triangle has 3 sides. 6 triangles have —— $\times$ 3 sides, or —— sides.

A
triangle

8. Seven triangles will have —— sides.

9. $5 \times 3 =$ ——. $6 \times 3 =$ ——. $7 \times 3 =$ ——.

10. The figure in the margin is a **square.** Since the sides are each equal to one inch, it is a **square inch.** Draw 3 square inches side by side in a row.

A square

11. Draw 5 such rows. How many square inches in 5 rows of 3 squares each?

12. Draw 8 such rows. How many square inches in 8 rows of 3 each? $8 \times 3 =$ ——.

13. How many in 9 such rows? How many in 10 rows?

14. $9 \times 3 =$ ——. $10 \times 3 =$ ——.

1. □'s means squares. It takes —— rows of 3 □'s each to make 9 □'s. One third of 9 is ——.

One third is written $\frac{1}{3}$.

2. Six 3's are 18. $\frac{1}{3}$ of 18 is ——.

3. Seven 3's are ——. $\frac{1}{3}$ of —— is 7.

Give results rapidly.

4. $\frac{1}{3}$ of 24 is ——; —— × 3 = 24; 3 in 24 = ——; 24 ÷ 3 = ——.

5. 8 × 3 = 24; 24 ÷ 3 = ——; 9 × 3 = ——; 9 is $\frac{1}{3}$ of ——.

6. Count by 3's from 3 to 30.   **7.** From 30 to 3.

8. Fill the first blank with any number you choose.

When 1 orange costs 3 cents, —— oranges will cost —— × 3 cents, or —— cents.

9. Let other numbers be chosen for the first blank.

10.	11.	12.	13.	14.	15.	16.
23 +	23	33 +	33	42 +	42	62
23	× 3	33	× 3	42	× 3	× 3
23		33		42		

17. $51 + 51 + 51 = $ ——.

18. $153 \div 3 = $ ——.

19. $62 + 62 + 62 = $ ——.

20. $186 \div 3 = $ ——.

21. $83 + 83 = $ ——.

22. $166 \div 2 = $ ——.

Copy and complete : —

1.
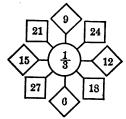
$\frac{1}{3}$ of $18 + 2 =$ ———.

——— $\times 9 = 18$.

——— is $\frac{1}{3}$ of 21.

3 in 27 ———.

Give results rapidly.

2.

$6 \times 2 + 4 =$ ———.

$4 \times 3 + 2 =$ ———.

$18 =$ ——— $\times 3$.

$\frac{1}{3}$ of $27 + 8 =$ ———.

3.

$2 \times 2 \times 3 =$ ———.

$\frac{1}{2}$ of $12 \times 3 =$ ———.

$\frac{1}{3}$ of $15 \times 2 =$ ———.

6 is $\frac{1}{3}$ of $2 \times$ ———.

4. Compare 3 and 6 thus : 3 is $\frac{1}{2}$ of 6 ; 6 is 2 times 3.

In the same way compare : —

5. 2 and 6.   **8.** 3 and 12.   **11.** 2 and 16.

6. 3 and 9.   **9.** 2 and 10.   **12.** 3 and 18.

7. 2 and 8.   **10.** 3 and 15.   **13.** 3 and 21.

Give the quotients and the remainders : —

14. $3\overline{)16}$ $3\overline{)17}$ $3\overline{)22}$ $3\overline{)25}$ $3\overline{)28}$ $3\overline{)27}$ $3\overline{)30}$

15. $3\overline{)11}$ $3\overline{)7}$ $3\overline{)31}$ $3\overline{)33}$ $3\overline{)29}$ $3\overline{)23}$ $3\overline{)26}$

16. $\begin{array}{r} 23 \\ \times 3 \\ \hline \end{array}$ **17.** $\begin{array}{r} 42 \\ \times 3 \\ \hline \end{array}$ **18.** $\begin{array}{r} 62 \\ \times 3 \\ \hline \end{array}$ **19.** $\begin{array}{r} 71 \\ \times 3 \\ \hline \end{array}$ **20.** $\begin{array}{r} 83 \\ \times 3 \\ \hline \end{array}$ **21.** $\begin{array}{r} 90 \\ \times 3 \\ \hline \end{array}$

22. $\begin{array}{r} 124 \\ \times 2 \\ \hline \end{array}$ **23.** $\begin{array}{r} 243 \\ \times 2 \\ \hline \end{array}$ **24.** $\begin{array}{r} 344 \\ \times 2 \\ \hline \end{array}$ **25.** $\begin{array}{r} 321 \\ \times 2 \\ \hline \end{array}$ **26.** $\begin{array}{r} 432 \\ \times 3 \\ \hline \end{array}$ **27.** $\begin{array}{r} 541 \\ \times 2 \\ \hline \end{array}$

28. $\frac{1}{3}$ of $24 =$ ———. $\frac{1}{3}$ of $27 =$ ———. $\frac{1}{3}$ of $21 =$ ———.

1. Make a row of 4 squares. How many squares in two such rows? How many in three such rows?

2. $4 + 4 =$ ——. $2 \times 4 =$ ——. $4 + 4 + 4 =$ ——. $3 \times 4 =$ ——.

3. There are 4 apples on each of 4 plates. How many in all? $4 + 4 + 4 + 4 =$ ——. $4 \times 4 =$ ——.

4. How many cents will 5 4-cent oranges cost? $5 \times 4 =$ ——.

5. After each of 6 boys has put 4 pears into a basket, it will have —— pears in it.

6. Count from 4 to 24 by 4's.

7. $7 \times 4 =$ ——; $28 + 4 =$ ——; 8 fours are ——; $8 \times 4 =$ ——.

8. How many □'s in 9 rows of 4 □'s each? 9×4?

9. Ten 4's are ——. $10 \times 4 =$ ——. 10×4 cents = —— cents.

10. What will 7 oranges cost at 4 cents each?

11. 8 yards of ribbon at 4 cents a yard will cost ——, for 8×4 cents = —— cents.

12. Give 10 multiples of 4.

13. Make a multiplication table of 4's.

Fill the first blank with any number: —

14. When one lemon costs —— cents, 4 lemons will cost —— × —— cents, or —— cents.

15. 4×5 4×8 4×9 4×2

16. 4×7 4×3 4×6 4×10

1. How many 2's in 8 ?   How many 4's in 8 ?
2. $\frac{1}{2}$ of 8 = ———. $\frac{1}{4}$ of 8 = ———.   8 ÷ 2 = ———.
3. 8 = ——— 4's.   12 = ——— 4's.   16 = ——— 4's.
4. $\frac{1}{4}$ of 8 = ———. $\frac{1}{4}$ of 12 = ———. $\frac{1}{4}$ of 16 = ———.
5. Compare 2 and 8, thus: 2 is $\frac{1}{4}$ of 8 ; 8 is 4 times 2.
6. Compare 4 and 8 ; 4 and 12 ; 2 and 12 ; 3 and 12.
7. 2 is $\frac{1}{4}$ of ———.   3 is $\frac{1}{4}$ of ———.   4 is $\frac{1}{4}$ of ———.
8. If I should give 24 pears to 4 girls, each girl would receive ——— pears, for $\frac{1}{4}$ of 24 is ———.
9. $\frac{1}{4}$ of 28 = ———. $\frac{1}{4}$ of 32 = ———. $\frac{1}{4}$ of 36 = ———.
10. Compare 7 and 28 ; 8 and 32 ; 9 and 36 ; 10 and 40.

11.	12.	13.	14.	15.	16.
42	91	80	72	61	50
× 4	× 4	× 4	× 4	× 4	× 4

17.	18.	19.	20.	21.	22.
621	702	311	512	402	712
× 4	× 4	× 4	× 4	× 4	× 4

23.	24.	25.	26.	27.	28.
4)84	4)168	4)120	4)248	4)324	4)360

Drill Exercises

Give results rapidly.

1. Can you mention some liquids sold by the pint? By the quart? By the gallon?

2. Which is the smallest of the three measures? Which is the largest?

3. Learn and recite the following table of

Liquid Measure

2 **pints** (pt.) = 1 **quart** (qt.)
4 **quarts**   = 1 **gallon** (gal.)

4. A fourth of a pint is some-times called a **gill**, but this measure is seldom used. How many gills in a pint?

NOTE. — The measures themselves should be used by the class in measuring dry sand or some convenient material until the relations are fixed.

5. Two pints make a quart; 18 pints make —— quarts, for there are —— 2's in 18.

6. One gallon is 4 quarts; 6 gallons are —— times —— quarts, or —— quarts. 11 gal. = —— quarts.

7. With a gallon measure I can dip out —— quarts at a time; to dip out 28 quarts I should have to dip —— times, for there are —— 4's in 28.

8. It takes —— pints to make a quart, and —— pints to make a gallon.

9. Out of a 4-gallon cask of vinegar I can fill —— gallon jugs or —— quart bottles.

Copy and fill the blanks : —

1. 1 pt. = —— gi.
   2 pt. = —— gi.
   3 pt. = —— gi.
   5 pt. = —— gi.
   —— pt. = 16 gi.
   —— pt. = 24 gi.

2. 2 pt. = —— qt.
   4 pt. = —— qt.
   ·3 pt. = —— qt.
   6 qt. = —— pt.
   16 qt. = —— pt.
   12 qt. = —— pt.

3. 1 gal. = —— qt.
   2 gal. = —— qt.
   4 gal. = —— qt.
   12 qt. = —— gal.
   20 qt. = —— gal.
   7 gal. = —— qt.

4. 6 pt. = —— gi.
   3 qt. = —— pt.
   8 gal. = —— qt.
   20 gi. = —— pt.
   .24 pt. = —— qt.
   40 qt. = —— gal.

5. Our cow gives a gallon of milk. This will fill a quart bowl —— times, or a pint bowl —— times.

6. When we burn a pint of oil every night, a gallon will last us —— nights, for there are —— pints in a gallon.

7. If we take a quart of milk a day, in 28 days we shall have taken —— quarts, or —— gallons.

8. When a gallon of oil costs 12 cents, a quart, or $\frac{1}{4}$ of a gallon, will cost $\frac{1}{4}$ of ——, or ——.

9. If a quart of nuts costs 5 cents, a gallon or 4 quarts will cost —— × 5 cents, or —— cents.

10. When oil is 16 cents a gallon, a quart will cost —— cents, because ——.

1. We find the **sum** of several numbers by ———.

2. By ——— we find the **remainder** when part of a number is taken out of it.

3. What shall I put with 231 to make 432?

4. Subtract 356 from 648.

WORK		EXPLANATION. —

$648 = 500 + 140 + 8$ $648 = $ minuend

$356 = 300 + \ 50 + 6$ $356 = $ subtrahend

$\overline{292 \quad \ \ 200 + \ \ 90 + 2}$ $292 = $ remainder

EXPLANATION. — 6 ones from 8 ones, 2 ones; 5 tens cannot be taken from 4 tens, so out of the 6 hundreds we take 1 hundred, change it to 10 tens and put it with the 4 tens, making 14 tens; 5 tens from 14 tens = 9 tens; 3 hundreds from 5 hundreds = 2 hundreds. Remainder, 292.

We can check our work by seeing whether 356 + 292 will equal 648.

Subtract and check : —

5.	6.	7.	8.	9.	10.
647	876	943	842	365	474
556	692	552	391	184	292

11. $564 - 372$.   18. $3412 - 516$.   25. $\$2.47 - \$1.29$.

12. $981 - 468$.   19. $6421 - 827$.   26. $\$2.46 - \$1.50$.

13. $283 - 85$.   20. $1283 - 349$.   27. $\$3.94 - \$2.78$.

14. $945 - 639$.   21. $6832 - 684$.   28. $\$5.88 - \$1.75$.

15. $632 - 521$.   22. $951 - 327$.   29. $\$6.75 - \$3.39$.

16. $785 - 318$.   23. $8329 - 849$.   30. $\$5.24 - \$4.88$.

17. $841 - 649$.   24. $6213 - 847$.   31. $\$3.91 - \$2.89$.

32. From the sum of 324 and 576 take 324.

33. Take 876 from the sum of 762 and 649.

1. One part of $ 3.94 is $1.51; find the other part.

2. Put together $1.59, $6.24, $8.37, and $5.62.

3. $369 + 542 + 387 + 921 - 849 = $ ——.

4. $4783 - 927 - 342 - 871 = $ ——.

5. $4.76, $2.57, and $1.75 are the three parts of what number?

6. Edward received $8.32 at one time, and $1.65 at another. He paid out $4.19. What had he left?

7. A farmer has 38 acres of corn, 41 acres of wheat, and 19 acres of meadow. How many acres in all?

8. My pony cost $48, the harness $16, and the phaeton $65. What did all this cost me?

9. A farmer has 268 sheep and one half as many pigs. How many pigs has he? How many animals in all?

10. A postal clerk has 396 letters for Boston, 396 for New York, 1240 for Chicago, 209 for Washington, and 3627 for other places. How many letters has he in all?

11. James has $39.42; Henry has $14.36; Paul has as much as both James and Henry. How much money has Paul? How much have all three?

12. Take 368 from the sum of 246 and 397.

13.	14.	15.	16.	17.
915	283	374	263	876
347	527	639	647	849
738	982	874	672	764
728	129	937	804	374

1. A man paid $38 for a pony and $56 for a little phaeton, and sold them both for $16 more than they cost him. What did he get for them ?

2. In a small city are four ward schools. In one school are 417 pupils, in another 563, in another 398, and in the fourth 619. How many pupils are enrolled in the four schools?

3. A man paid $540 for a lot. He built a house on it costing $2340, a barn costing $982, spent in grading the lawn $23, and paid $86 for walks. What was the total cost of the property?

4. A man bought a house for $3400. He paid $1375 at one time, $564 at another time, and $768 at another. How much does he still owe ?

5. A trader paid $750 for three horses. He sold one for $328, another for $263, and the other for $378. What did he make on the three ?

6. A merchant's sales for the week were as follows: Monday $368, Tuesday $419, Wednesday $396, Thursday $463, Friday $411, Saturday $763. What were the total sales for the week ?

7. I bought three loads of coal containing the following number of pounds: 5268 pounds, 4973 pounds, 5098 pounds. How many pounds did I buy ?

8. A man paid $756 for a building lot and paid out for lumber to build a house, $936, to the workmen $538, for other material $498. Find the total cost of the property.

1. Henry gathered 3 quarts of nuts, and John 4 times as many. How many did both gather?

2. Lucy has 18 hens, and Mary $\frac{1}{3}$ as many. How many has Mary? How many have both?

3. James caught 36 fish; $\frac{1}{4}$ of them were perch. How many were perch?

4. If a man can walk 4 miles per hour, how long will it take him to walk 28 miles at this rate?

5. 3 is $\frac{1}{3}$ of what number? 3 is $\frac{1}{6}$ of what number?

6. 3 boys bought a melon for 15 cents. What shall each boy pay?

7. Harry had 32 marbles and sold $\frac{1}{4}$ of them. How many did he sell? How many had he left?

8. Frank bought a pair of rabbits for 35 cents and sold them for 50 cents. What did he gain?

9. What will 3 pints of milk cost at 6¢ per quart?

10. At 4¢ a pint, what will 7 pints of milk cost?

11. A square has four equal sides. How far around a 6-inch square?

12. If each side of a triangle is 8 inches, how far around it?

13. What will 3 quarts of peanuts cost at 4¢ a pint?

14. 2 quarts of nuts for 32¢ is how much per pint?

15. When 3 oranges cost 5 cents, what will 6 cost? What will 9 cost? What will 12, or 1 dozen, cost?

Seven letters are sometimes used in writing numbers. They are called *Roman Numerals,* and are

I	V	X	L	C	D	M
1	5	10	50	100	500	1000

Other numbers are written by using two or more of these letters together. Thus : —

Ones.	Tens.		Tens + Ones.		
1=I	10=X	10+2=X	+II	=XII	= 12.
2=II	20=XX	20+3=XX	+III	=XXIII	= 23.
3=III	30=XXX	30+4=XXX	+IV	=XXXIV	= 34.
4=IV	40=XL	40+5=XL	+V	=XLV	= 45.
5=V	50=L	50+6=L	+VI	=LVI	= 56.
6=VI	60=LX	60+7=LX	+VII	=LXVII	= 67.
7=VII	70=LXX	70+8=LXX	+VIII	=LXXVIII	= 78.
8=VIII	80=LXXX	80+9=LXXX	+IX	=LXXXIX	= 89.
9=IX	90=XC	90+5=XC	+V	=XCV	= 95.
10=X	100=C	100+6=C	+VI	=CVI	=106.

1. Read the following numbers of chapters in a book:—

XI	XXV	XXXI	XLVI	LXXXV
XIV	XXVII	XXXV	LVIII	LXXXVI
XVI	XXIX	XXXVI	LXXI	XCVIII

2. Write the following numbers in Roman Numerals:—
15, 17, 23, 36, 45, 53, 69, 74, 86, 97, 108.

3. Where have you seen Roman Numerals used?

4. Once in a while the number of the year is written in this way. Thus 1620 is written MDCXX

$$M + D + C + XX = MDCXX$$
$$1000 + 500 + 100 + 20 = 1620$$

Select from column **A** *the number opposite each letter in the words below and add the numbers thus taken.* Thus using the word *care,*

$$c = 1052$$
$$a = 2432$$
$$r = 8673$$
$$e = 5432$$
$$\overline{17{,}589}$$

A			B	
a	2432		*a*	4934
b	5243		*b*	5678
c	1052		*c*	6789
d	2345		*d*	5427
e	5432		*e*	6958
f	6533		*f*	3754
g	2107		*g*	6849
h	3756		*h*	3985
i	2683		*i*	7667
j	7546		*j*	8998
k	8359		*k*	4935
l	3625		*l*	6498
m	4267		*m*	3776
n	5426		*n*	5492
o	9325		*o*	7896
p	4763		*p*	3894
q	9245		*q*	4977
r	8673		*r*	6583
s	2905		*s*	9878
t	3876		*t*	4796
u	8547		*u*	6948
v	9458		*v*	3778
w	6477		*w*	6945
x	8532		*x*	3099
y	4651		*y*	7856
z	7896		*z*	6483

1. care
2. aunt
3. bond
4. from
5. inch
6. milk
7. plum
8. word
9. buzz
10. what
11. drug
12. join
13. lily
14. path
15. skip
16. their
17. foxes
18. quick
19. eight
20. dizzy

21. wrong
22. brisk
23. charm
24. drown
25. empty
26. friend
27. gnash
28. handy
29. perch
30. whack
31. absence
32. quietly
33. zealous
34. trumpet
35. wicked
36. smother
37. sweetly
38. trusty
39. careful
40. extreme

41-80. *Use column* B *in the same way.*

To Teacher. — Assign other words at pleasure.

1 inch	3 inches

A square			

One square inch   Three square inches
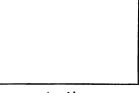
1. We measure the *length* of anything by a *line* (as the edge of a ruler) an *inch* long, a *foot* long, or a *yard* long.

$$12 \text{ inches (in.)} = 1 \text{ foot (ft.)}$$
$$3 \text{ feet} \qquad = 1 \text{ yard (yd.)}$$

2. We measure a surface, as the top of your desk, the blackboard, or the wall or floor of a room by a **square surface** as a **square inch**, a **square foot**, or a **square yard.**

3. A diagram like the one at the right, which is longer than it is wide, is an **oblong**. How long is the oblong at the top of the page? How wide?

An oblong

4. How many square inches in an oblong 1 inch wide and 3 inches long?

5. Place 4 square inches so as to form an oblong. How long is it? How wide?

6. Place the 4 square inches so as to form a larger square. How long is it?

Draw oblongs to represent some of the following : —

1. How many square inches will it take to make an oblong 3 inches wide and 6 inches long? 3 inches wide and 8 inches long?

2. If an oblong is made from 15 square inches and is 3 inches wide, how long is it? If it is 3 inches wide and contains 18 square inches, how long is it?

3. I have 21 squares an inch long. How long an oblong can I make if it is to be 3 inches wide?

4. If I have 8 one-inch squares, I can make an oblong 2 inches wide and 4 inches long, or one inch wide and —— inches long.

5. Tell three kinds of oblongs that you can make from 12 one-inch squares.

6. An oblong 4 inches wide contains 20 square inches. How long is it?

7. An oblong 8 inches long contains 32 square inches. How wide is it?

8. A square contains 9 square inches. How long is one side?

9. A square contains 16 square inches. How long is one side?

10. Make as many oblongs as you can from 18 one-inch squares.

11. Make as many oblongs as you can from 24 one-inch squares.

12. An oblong 4 in. by 10 in. contains —— sq. in.

1. How many square inches in an oblong 2 inches wide and 8 inches long?

2. Instead of saying " 2 inches wide and 8 inches long," we might have said " 2 inches by 8 inches." Draw an oblong 3 inches by 6 inches. How many square inches will it make?

3. $\frac{1}{2}$ of 12 inches = —— inches. $\frac{1}{2}$ of a foot = —— inches.

4. $\frac{1}{3}$ of 12 inches = —— inches. $\frac{1}{3}$ of a foot = —— inches.

Make a multiplication table of 2's, 3's, and 4's, thus : —

5. $2 \times 2 = 4$	6. $2 \times 3 = 6$	7. $2 \times 4 =$ ——
$3 \times 2 = 6$	$3 \times 3 =$ ——	$3 \times 4 =$ ——
$4 \times 2 =$ ——	$4 \times 3 =$ ——	$4 \times 4 =$ ——

etc., to $10 \times 2 =$ —— to $10 \times 3 =$ —— to $10 \times 4 =$ ——

Make a division table of 2's, 3's, and 4's, thus : —

8. $4 \div 2 = 2$	9. $6 \div 3 = 2$	10. $8 \div 4 = 2$
$6 \div 2 = 3$	$9 \div 3 = 3$	$12 \div 4 = 3$

to $20 \div 2 =$ —— to $30 \div 3 =$ —— to $40 \div 4 =$ ——

11. $\frac{1}{2}$ of a quart = —— pint. $\frac{1}{2}$ of a gallon = —— pints.

12. $\frac{1}{4}$ of a gallon = —— quart. $\frac{1}{4}$ of a foot = —— inches.

13.	342	512	132	723	822
	$\times 2$	$\times 4$	$\times 3$	$\times 3$	$\times 4$

14.	433	643	712	831	921
	$\times 3$	$\times 2$	$\times 4$	$\times 3$	$\times 4$

15. $3\overline{)963}$ $4\overline{)168}$ $2\overline{)846}$ $3\overline{)1596}$ $4\overline{)1284}$

16. $2\overline{)1286}$ $3\overline{)2193}$ $3\overline{)189}$ $4\overline{)2480}$ $4\overline{)1688}$

1. What will two 5-cent oranges cost? $2 \times 5 =$ ——.

2. What will three 5-cent pencils cost? $5 + 5 + 5 =$ ——. $3 \times 5 =$ ——.

3. Make a row of 5 squares. Make 4 such rows. How many squares in all?

4. Five 5's are ——. I can prove this by adding 5 —— times.

5. 6 five-cent pieces are worth —— cents. $6 \times 5 =$ ——.

6. $6 \times 5 = 30$; $30 + 5 =$ —— $\times 5$. $7 \times 5 =$ ——.

7. Count by 5's from 5 to 35.

8. Count backward by 5's from 35 to 5.

9. When Nellie gets one more nickel, she will have 35 cents. She must now have —— nickels.

10. 8 rows of 5 squares each are how many squares? $8 \times 5 =$ ——. 8 nickels are —— cents.

11. 5, 5, 5, 5, 5, 5, 5, and 5 are eight 5's or ——.

12. $40 + 5 = 45$. $45 =$ —— 5's. $9 \times 5 =$ ——.

13. $45 + 5 = 50$. $50 =$ —— 5's. $10 \times 5 =$ ——.

14. What will 4 quarts of milk cost at 5 cents a quart?

15. Seven quarts of berries at 5 cents a quart will cost —— cents for 7×5 cents $=$ —— cents.

16. Drill Exercises.

Give products rapidly.

17. Copy thus: $5 \times 6 = 30$, $5 \times 5 =$ ——, etc.

1. Two 5-cent pieces are the same as —— cents or —— dime. 5 is $\frac{1}{2}$ of ——; $2 \times 5 =$ ——.

2. If a pound of meat costs 15 cents, $\frac{1}{3}$ of a pound will cost $\frac{1}{3}$ of —— or ——. $\frac{1}{3}$ of $15 =$ ——.

3. Four quarts of milk at 5 cents a quart will cost —— cents.

4. For 20 cents I can get —— oranges at 5 cents each. One fifth of 20 is ——. $\frac{1}{5}$ of 20 is ——.

5. Five 5's are ——. $\frac{2}{5}$ of $25 = 2 \times \frac{1}{5}$ of 25 or ——.

6. $5 \times 6 =$ ——. If I put 30 chickens into 5 coops, there will be —— in each coop. $\frac{1}{5}$ of $30 =$ ——.

7. $8 \times 5 =$ ——. $\frac{1}{5}$ of 40 ——.

8. At 5 cents each I can buy —— oranges for 40 cents, for there are —— 5's in 40.

9. $5 \times 9 =$ ——. $\frac{1}{5}$ of $45 =$ ——.

10. I gave 45 peaches to 5 boys. Each boy must have received —— peaches, for $\frac{1}{5}$ of 45 peaches is ——.

11. There are —— 5's in 40, for $5 \times$ —— $= 40$.

12. My weekly milk bill is 35 cents. If I pay 5 cents a quart, I must have received —— quarts.

13. Our cow gives $1\frac{1}{2}$ gallons of milk a day. At 5 cents a quart, this is worth —— cents.

14. **Drill Exercises.**

Give quotients rapidly.

15. Copy thus: $\frac{1}{5}$ of $25 = 5$, $\frac{1}{5}$ of $35 = 7$, etc.

Increase each of the following numbers by 10, 20, 30, *and so on to* 90, *by lines and by columns. Practice until you can give results rapidly.*

	A	B	C	D	E	F	G	H	I
1	13	64	60	90	85	48	89	54	25
2	74	91	33	20	63	16	77	78	10
3	38	19	79	39	34	67	40	24	53
4	56	32	92	14	57	26	35	88	43
5	37	81	49	93	36	52	17	23	72
6	51	15	96	59	27	83	65	99	68
7	31	61	69	29	95	21	94	42	84
8	70	87	28	98	18	41	55	80	75
9	58	50	97	46	82	62	22	12	66
10	47	11	71	30	86	73	45	76	44

11. Subtract 10 from each of the numbers above.

12. Subtract 20 from each number larger than 20. Take 30 from each number larger than 30. Do the same with 40 ; 50 ; 60 ; 70 ; 80 ; 90. Give the results by columns and by lines.

NOTE. — This should frequently be referred to for a drill exercise until sums or differences can be recognized at sight.

1. Put six 5's together into one product, and we have ——.

2. Ten nickels together make —— cents, or a ——.

3. Putting equal numbers together into one product is ——.

Copy and complete the following : —

4. $2 \times 2 = 4$
$2 \times 30 = 60$
$2 \times 100 = 200$
$2 \times 132 = \text{——}$

5. $3 \times 3 = 9$
$3 \times 20 = 60$
$3 \times 200 = 600$
$3 \times \text{——} = \text{——}$

6. $4 \times 1 = \text{——}$
$4 \times 20 = \text{——}$
$4 \times 200 = \text{——}$
$4 \times \text{——} = \text{——}$

7. $4 \times 4 = 16$
$4 \times 20 = 80$
$4 \times 300 = 1200$
$4 \times 324 = \text{——}$

8. $5 \times 3 = \text{——}$
$5 \times 40 = \text{——}$
$5 \times 200 = \text{——}$
$5 \times 243 = 1215$

9. $5 \times 435 = \text{——}$
$5 \times 5 = \text{——}$
$5 \times 30 = \text{——}$
$5 \times 400 = \text{——}$

10. Put 435, 435, 435, 435, and 435, or, five 435's together, or in other words, multiply 435 by 5.

ADDITION	MULTIPLICATION
435	$43\overset{.}{5}$ = multiplicand
435	5 = multiplier
435	2175 = product
435	
435	
2175, sum	

EXPLANATION.—5×5 ones = 25 ones = 2 tens + 5 ones; write the 5 ones; 5×3 tens = 15 tens; adding the 2 tens (of the 25 ones), we have 17 tens = 1 hundred + 7 tens; write the 7 tens; 5×4 hundreds = 20 hundreds; adding the 1 hundred (of the 17 tens), we have 21 hundreds, which we write in the product. Product = 2175.

11. 217×2 **12.** 325×3 **13.** 234×4 **14.** 631×5 **15.** 582×2

1. I pay $43 for a pony and 4 times as much for a buggy. Find the cost of the buggy.

2. Find the cost of 4 tons of hay at $18 per ton, and 5 tons of straw at $12 per ton.

3. A farmer has 68 sheep in one flock and 5 times as many in another. How many sheep in both flocks?

4. A farmer raised 175 bushels of potatoes from one acre of land. What might he expect from 5 acres?

5. If I read 34 pages every day, how many pages can I read in 4 days?

6. 637	**7.** 721	**8.** 319	**9.** 864	**10.** 973
× 3	× 2	× 4	× 3	× 5

11. 947	**12.** 678	**13.** 897	**14.** 762	**15.** 638
× 3	× 2	× 4	× 5	× 4

16. Make a diagram like this, and fill the squares with multiples of 1, 2, 3, 4, and 5.

1	2	3	4	5	6	7	8	9	10
2	4	6	8						
3	6	9							
4	8								
5									

1. Make an oblong one inch wide and 16 inches long. How many square inches does it contain? How many square inches in 5 such oblongs?

2. 5 oblongs one inch wide and 16 inches long will make an oblong —— wide and 16 inches long, containing —— × 16 square inches or —— square inches.

3. Find the cost of 5 tons of hay when 1 ton costs $16.

4. A boy paid $28 for a pony and 3 times as much for a phaeton. Find the cost of both.

5. If a man earns $85 a month and spends $48 of it, what does he save in 5 months?

6. A farmer has 5 acres of beans. If he gets 38 bushels from one acre, what can he expect from the 5 acres?

7. A farmer gets 168 bushels of wheat from 5 acres. At this rate how much will he get from 10 acres?

8. A man earns $950 per year and spends $658 of it. At this rate what can he save in 4 years?

9. A trader bought 5 horses at $236 each and sold them for $310 each. What did he gain on the 5?

10. A merchant sold goods for $936. If he gained $288, what did they cost him?

11. For what must a house costing $3280 be sold so as to gain $985?

12. If a man gathers 1685 bushels of apples from an orchard of 10 acres, how many bushels may he expect from 20 acres of like orchard?

Use any one of the following numbers to fill the first blank in Ex. 1, *and then solve the problem:* —

3,   7,   5,   8,   9,   6,   4,   2,   5,   10.

1. When 1 quart of milk costs 5 cents, —— quarts will cost —— times 5 cents, or —— cents.

2. What will 4 oranges cost at 3¢ each?

3. At 5¢ a pound, what will 9 pounds of rice cost?

4. What will 9 yards of lace cost at 4¢ a yard?

5. At $ 2 a bushel, what will 7 bushels of beans cost?

Use one of these numbers to fill the first blank in Ex. 6: —

16,   12,   20,   8,   24,   36,   40,   28,   32.

6. When 4 pounds of sugar costs —— cents, 1 pound will cost ¼ of —— cents, or —— cents.

7. 4 quarts of oil cost 28¢. What will 1 quart cost?

8. What will 1 quart of milk cost when 5 qt. cost 50¢?

9. 3 yards of silk cost $ 18. What will 1 yard cost?

10. What will one pound of nails cost when 5 pounds cost 35¢?

Use one of these numbers to fill the first blank in Ex. 11: —

10,   20,   15,   35,   40,   25,   30,   45,   50.

11. When 5 pints of oil cost —— cents, one pint will cost ⅕ of —— cents, or —— cents; 3 pints will cost 3 × —— cents, or —— cents.

12. 2 pounds of sugar cost 12¢. What will 3 pounds cost?

Give first the sums, and then the differences : —

1. 12	9	17	24	13	19	36	15	16
6	12	8	9	7	2	7	7	8

2. 44	29	51	26	35	49	73	65	43
20	8	7	3	20	8	7	9	8

Give the products rapidly : —

3. 9	7	8	6	3	5	9	4	10	8	5
2	3	4	5	3	4	5	2	4	3	5

4. 6	3	2	4	7	6	5	7	9	6	7
3	5	4	4	3	5	4	4	3	2	5

Give quotients rapidly : —

5. 4)40   4)28   5)35   4)16   5)20   4)24   3)18

6. 4)32   4)36   5)45   5)50   3)21   3)9   3)12

Give quotients and remainders : —

7. 4)19   5)23   4)23   3)17   4)25   5)27   5)34

8. 3)20   5)31   4)33   3)29   3)32   5)32   5)47

9. *Give $\frac{1}{2}$ of:* 10, 12, 14, 18, 20, 8, 16, 6.

10. *Give $\frac{1}{3}$ of:* 9, 12, 21, 18, 15, 24, 30, 27.

11. *Give $\frac{1}{4}$ of:* 32, 16, 20, 12, 24, 8, 28, 36, 40.

12. *Give $\frac{1}{5}$ of:* 30, 20, 40, 15, 25, 45, 35, 10, 50.

1. Count by 4's from 1 to 97 ; from 2 to 98 ; from 3 to 99.

2. Give the first 10 multiples of 4, thus 4, 8, etc.

3. Give $\frac{1}{4}$ of

32,   16,   24,   36,   40,   28,   20,   12.

4. $\frac{3}{4}$ of 20 means 3 times $\frac{1}{4}$ of 20, or 3 × ——, and is read *three fourths*.

5. Find $\frac{3}{4}$ of

16,   24,   20,   12,   40,   32,   28,   36.

6. Give the first 10 multiples of 5, thus 5, 10, 15, etc.

7. Count by 5's from 1 to 96 ; from 2 to 97 ; from 3 to 98 ; from 4 to 99.

8. Find $\frac{1}{5}$ of

45,   35,   25,   40,   30,   20,   15.

9. Find $\frac{2}{5}$ of each of the numbers given in Ex. 8.

10. Find $\frac{3}{5}$ of the same numbers.

11. Find $\frac{4}{5}$ of the same numbers.

12. Make an oblong 4 inches by 5 inches. How many square inches does it contain ?

13. How many rows of oblongs 1 inch by 8 inches will make an oblong containing 24 square inches ?

14. Make an oblong containing 12 square inches. How long and how wide is it ?

15. How long and how wide must an oblong be to contain 15 square inches ?

1. $\frac{1}{2}$ of $6 =$ ———. $\frac{1}{2}$ of 8 quarts = ——— quarts.

2. To get $\frac{1}{2}$ of $6 we divide it into ——— equal parts.

3. To get $\frac{1}{2}$ of 8 quarts we divide it into ——— equal parts.

4. To get $\frac{1}{2}$ of a circle or an oblong or anything we divide the thing into two equal parts.   How many *halves* in a circle ?   How many in an oblong ?

5. $1 =$ ——— halves. $\frac{1}{2} + \frac{1}{2} =$ ———. $1 - \frac{1}{2} =$ ———.

6. $\frac{1}{4}$ of 12 days = ——— days. $\frac{1}{4}$ of 16 feet = ——— feet.

7. To get $\frac{1}{4}$ of 16 feet we divide it into ——— equal parts.

8. To get $\frac{1}{4}$ of a circle or an oblong we divide it into ——— equal parts.

9. $\frac{1}{2}$ will make ——— fourths. $2 \times \frac{1}{4} =$ ———. $\frac{1}{4} + \frac{1}{4} =$ ———.

10. $1 = \dfrac{?}{2}$. $1 = \dfrac{?}{4}$. $\dfrac{1}{2} + \dfrac{1}{4} = \dfrac{?}{4}$. $\dfrac{1}{2} - \dfrac{1}{4} =$ ———.

11. When $\frac{1}{2}$ of a farm is worth $600, what is the whole farm worth ?

12. When $\frac{1}{4}$ of a bushel of potatoes is worth 12 cents, what is a bushel worth ?

1. Albert earned $3.72 in a week, and Edward earned $2.89. They put their money together and bought a velocipede. What did it cost?

2. A farmer sheared 525 sheep in two weeks; the first week he sheared 278. How many did he shear the second week?

3. Six hundred ninety-four children are in a certain school; 398 are girls. How many are boys?

4. Add together $\frac{1}{2}$ of 16, $\frac{1}{3}$ of 27, $\frac{1}{4}$ of 32, $\frac{1}{5}$ of 45, and 3×8.

5. 78 cattle are in one drove, and 4 times as many in another. How many cattle are there in all?

6. 837 gallons of water were in a tank, but 395 gallons leaked out. How many gallons remained?

7. Take 5×89 away from 4×135.

8. A farmer raised 90 bushels of potatoes. He sold 70 bushels and used 12 bushels. How many bushels had he left?

9. My bicycle cost $28, my sled $6, and my pony and buggy 5 times as much as both the bicycle and sled. Find the cost of all.

10. Mr. Brown gathered 128 bushels of apples from one orchard and 312 bushels from another. How many bushels did he gather from both orchards?

11. Charles gathered 2 pecks of wild blackberries yesterday and sold them at 5 cents a quart. What did he earn?

1. $\frac{1}{4}$ of $16 = $ ——. $\frac{3}{4}$ of $16 = 3 \times$ —— or ——, for $\frac{3}{4}$ of any number means that $\frac{1}{4}$ of the number is to be found and then —— of these parts taken.

2. $\frac{2}{5}$ of $20 = 2 \times$ —— or ——. $\frac{2}{5}$ of $30 = $ ——.

Copy and fill blanks : —

3. $\frac{3}{4}$ of $12 = $ ——.

4. $\frac{2}{3}$ of $27 = $ ——.

5. $\frac{3}{5}$ of $35 = $ ——.

6. $\frac{4}{5}$ of $30 = $ ——.

7. $\frac{2}{3}$ of $18 = $ ——.

8. $\frac{2}{4}$ of $28 = $ ——.

9. $\frac{3}{5}$ of $40 = $ ——.

10. $\frac{4}{5}$ of $45 = $ ——.

11. $\frac{3}{4}$ of $36 = $ ——.

12. $\frac{2}{3}$ of $21 = $ ——.

13. $\frac{4}{5}$ of $25 = $ ——.

14. $\frac{3}{4}$ of $20 = $ ——.

15. $\frac{2}{3}$ of $12 = $ ——.

16. $\frac{3}{4}$ of $24 = $ ——.

17. $\frac{2}{5}$ of $40 = $ ——.

18. Draw an oblong 4 inches by 5 inches and divide into square inches. How many square inches in the oblong?

19. A square whose side is a foot long is a *square foot.* If your desk is 2 feet wide and 3 feet long, how many square feet does it contain?

20. How many square inches in an oblong 5 in. by 6 in.?

21. Compare 3 and 12. 3 is —— of 12; 12 is —— $\times 3$.

22. Compare 3 and 15; 3 and 21; 3 and 24.

Compare the following : —

23.	24.	25.	26.
3 and 27	5 and 30	4 and 32	3 and 18
4 and 16	5 and 25	5 and 40	4 and 24
5 and 20	3 and 9	4 and 36	5 and 35
4 and 12	4 and 20	5 and 45	4 and 28

1. $6+6=$ —.　Two 6's $=$ —.　$2 \times 6 =$ —.

2. $6+6+6=$ —.　$3 \times 6 =$ —.　$\frac{1}{3}$ of $18 =$ —.　$\frac{1}{6}$ of 18 $=$ —.

3. 6, 6, 6, and 6, or four 6's, are —.　$4 \times 6 =$ —.　$\frac{1}{6}$ of $24 =$ —.　$\frac{1}{4}$ of $24 =$ —.

4. $\frac{1}{6}$ of 24 is —.　$\frac{2}{6}$ of 24 is $2 \times$ — or —.

5. Make 5 rows of squares of six squares each.　How many in all?　$5 \times 6 =$ —.　$\frac{1}{6}$ of $30 =$ —.　$\frac{1}{5}$ of $30 =$ —.

6. $\frac{1}{6}$ of $30 =$ —.　$\frac{2}{6}$ of $30 = 2 \times$ — or —.　$\frac{3}{6}$ of $30 = 3 \times$ — or —.

7. Count by 6's from 6 to 36.　How many 6's make 36?

8. $\frac{1}{6}$ of $36 =$ —.　$\frac{2}{6}$ of $36 = 2 \times$ — or —.　$\frac{3}{6}$ of $36 =$ —.

9. $36 + 6 =$ —.　$7 \times 6 =$ —.　$\frac{1}{6}$ of $42 =$ —.
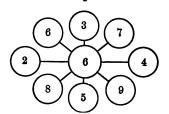
10. $\frac{1}{6}$ of $42 =$ —.　$\frac{2}{6}$ of $42 = 2 \times$ — or —.　$\frac{3}{6}$ of $42 =$ —.

11. $42 + 6 =$ —.　$7 \times 6 + 6 =$ —.　$8 \times 6 =$ —.
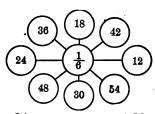
12. $\frac{1}{6}$ of $48 =$ —.　$\frac{2}{6}$ of $48 =$ —.　$\frac{3}{6}$ of $48 =$ —.

13. Nine 6's or $9 \times 6 =$ —.　$\frac{1}{6}$ of $54 =$ —.

14. Ten 6's or $10 \times 6 =$ —.　$\frac{1}{6}$ of $60 =$ —.

15. Count by 6's from 6 to 60.　From 60 to 6.

Give products quickly.　　*Give quotients quickly.*

1. 23	2. 42	3. 54	4. 34	5. 72
× 6	× 6	× 6	× 6	× 6

6. 21	7. 12	8. 39	9. 45	10. 87
× 6	× 6	× 6	× 6	× 6

11. How much does a boy earn in 2 weeks of 6 work days, if he earns 65 cents in one day?

12. A boy delivers 34 papers on each of five days and 48 on Saturday. How many does he deliver in all?

13. What does he earn a day if he gets 1 cent for delivering two papers? What does he earn in a week?

14. A boy has 4 recitations a day. How many recitations does he have in 6 weeks of 5 school days each?

15. What will 16 gallons of vinegar cost me at 6 cents a quart?

16. How many days in July? What will my milk bill be if I pay 6 cents a quart and get 1 quart a day?

17. Charles caught 27 perch, and James and Henry together caught 6 times as many. How many did all three catch?

18. A boy sells 23 copies of *The Evening News* and 19 copies of the *Journal* every day. How many does he sell in a week, not counting Sunday?

19. A farm is laid out into 6 fields of 40 acres each. How many acres in the whole farm?

1. Mr. Ward put 6 5-dollar bills into his pocketbook. How much did it then contain ?

2. Putting equal numbers together into one number is ——.

One of the equal numbers is called the **Multiplicand**.

The number that shows how many equal numbers are to be put together is the **Multiplier**.

The result of the multiplication is the **Product**.

3. In $6 \times \$5 = \$30$, $\$5$ is the *multiplicand*, 6 is the *multiplier*, and $\$30$ is the ——.

4. Multiplicand = 9 yards; multiplier = 6; product = ——.

5. A tank holds 72 gallons. How many 6-gallon jugs will it fill ?

6. In a dairy are 8 six-quart pans of milk. How large a can will they fill ?

7. At 6 for 1 cent, what will 42 apples cost ?

8. 60 minutes are 1 hour ; $\frac{1}{6}$ of an hour = —— minutes.

9. 9 is $\frac{1}{6}$ of —— ; 8 is $\frac{1}{6}$ of —— ; 12 is $\frac{1}{6}$ of ——.

10. Mary wrote 24 words and misspelled $\frac{1}{6}$ of them. How many did she have right ?

11. Out of a class of 48 boys, $\frac{1}{6}$ are absent. How many are at school ?

12. When 1 comb costs $6\cancel{f}$, 7 combs will cost $7 \times 6\cancel{f}$, or ——.

13. If you can earn $\$6$ a week, what can you earn in 4 weeks ?

1. Add $\frac{1}{6}$ of 18 and $\frac{1}{6}$ of 24.

2. $60 \div 6 = 10$.

60, the number to be divided, is the **Dividend**;

6, the number by which we divide, is the **Divisor**;

10, the result of the division, is the **Quotient**.

3. $48 \div 6 = $ ——.   The dividend is ——, the divisor is ——, and the quotient is ——.

4. The dividend is 24, the divisor 6, the quotient is ——.

5. The divisor is 6, the dividend 30, the quotient is ——.

6. Divisor $= 6$, dividend $= 66$, quotient $= $ ——.

7. The sign) is used to show that the number after it is to be divided by the number before it; it is read *in*. The quotient is written under the dividend.   Give the quotients.

$6\overline{)30}$ $6\overline{)48}$ $6\overline{)54}$ $6\overline{)72}$ $6\overline{)60}$ $6\overline{)18}$ $6\overline{)24}$ $6\overline{)66}$

8. There are 54 seats in a schoolroom, in 6 rows. How many seats in a row?

9. Five pigeons cost 60 cents.   What will 6 cost?

10. Six jars hold 18 quarts.   What will 10 jars hold?

12 things $= 1$ dozen (doz.)

11. A dozen eggs are 12 eggs; $\frac{1}{2}$ doz. $= $ ——.
$\frac{1}{3}$ doz. $= $ ——. $\frac{1}{4}$ doz. $= $ ——. $\frac{2}{3}$ doz. $= $ ——. $\frac{3}{4}$ doz. $= $ ——.

12. One dozen eggs cost 20 cents.   What will $\frac{1}{2}$ doz. cost?

13. How many boxes will hold 54 pencils, 6 in a box?

14. $\frac{1}{6}$ of $72? $\frac{1}{6}$ of 72 girls? $\frac{1}{6}$ of 18 quarts?

15. 5 is $\frac{1}{6}$ of ——.   7 is $\frac{1}{6}$ of ——.   4 is $\frac{1}{6}$ of ——.

1.	**2.**	**3.**	**4.**	**5.**	**6.**
21+	32+	45+	63+	75+	98+
21	32	45	63	75	98
21	32	45	63	75	98
21	32	45	63	75	98
21	32	45	63	75	98
21	32	45	63	75	98

$6 \times 21 = \quad 6 \times 32 = \quad 6 \times 45 = \quad 6 \times 63 = \quad 6 \times 75 = \quad 6 \times 98 =$

Find the product of these numbers, and add them : —

7.	**8.**	**9.**	**10.**	**11.**
$4 \times 30 =$	$3 \times 40 =$	$2 \times 60 =$	$4 \times 50 =$	$5 \times 80 =$
$5 \times 30 =$	$5 \times 40 =$	$4 \times 60 =$	$6 \times 50 =$	$6 \times 80 =$
$6 \times 30 =$	$6 \times 40 =$	$6 \times 60 =$	$5 \times 50 =$	$4 \times 80 =$

Find the difference between products : —

12.	**13.**	**14.**	**15.**	**16.**
$6 \times 70 =$	$5 \times 52 =$	$4 \times 64 =$	$6 \times 38 =$	$5 \times 79 =$
$3 \times 70 =$	$2 \times 52 =$	$6 \times 64 =$	$5 \times 38 =$	$6 \times 79 =$

Add quotients : —

17.	**18.**	**19.**	**20.**	**21.**
$50 \div 5 =$	$\frac{1}{6}$ of $36 =$	$42 \div 6 =$	$\frac{1}{5}$ of $45 =$	4 in 80 =
$27 \div 3 =$	$\frac{1}{5}$ of $40 =$	$35 \div 5 =$	$\frac{1}{3}$ of $18 =$	3 in 120 =
$16 \div 8 =$	$\frac{1}{4}$ of $28 =$	$48 \div 6 =$	$\frac{1}{6}$ of $24 =$	6 in 66 =

22. Add $2.35, $6.41, $5.25, $3.07, and $1.50.

23. Take $1.75 out of five dollars and a quarter.

24. What will six pairs of shoes cost at $1.25 a pair?

25. I had $54 and spent $\frac{1}{6}$ of it. What had I left?

1. A farmer had a 6-acre field of potatoes. How many bushels in his whole crop if he gets 236 bushels per acre?

2. If a boy earns 65 cents a day for 5 days, what does he earn in all?

3. How many quarts in 264 gallons?

4. 173 gallons of syrup will fill how many quart bottles?

5. A boy delivers 72 papers a day. How many does he deliver in 6 days?

Find the products: —

6.	7.	8.	9.	10.
268	793	865	931	827
6	5	6	4	5

11. 4×368.   14. 6×841.   17. 5×899.

12. 6×928.   15. 5×167.   18. 6×798.

13. 5×793.   16. 4×268.   19. 4×643.

Find the quotients: —

20.	21.	22.	23.	24.
4)168	5)155	6)186	3)969	4)208

25. $189 \div 3$.   28. $246 \div 6$.   31. $405 \div 5$.

26. $355 \div 5$.   29. $248 \div 4$.   32. $450 \div 5$.

27. $366 \div 6$.   30. $324 \div 4$.   33. $426 \div 6$.

34. $4 \times 236 \div 3$.   37. $726 \div 3 \times 4$.

35. $5 \times 240 \div 4$.   38. $840 \div 4 \times 5$.

36. $6 \times 150 \div 5$.   39. $792 \div 6 \times 3$.

1. Make 2 rows of 7 squares each.

2. Make 7 rows of 2 squares each.

3. Compare the number of squares in the two diagrams that you have made.

4. $2 \times 7 = $——. $7 \times 2 = $——. $7 + 7 = $——.

5. Compare two 7's with seven 2's.

6. $7 + 7 + 7 = $——. $3 \times 7 = $——. $7 \times 3 = $——.

7. What are seven 4's, or 7×4? $4 \times 7 = $——.

8. $7 \times 5 = $——. $5 \times 7 = $——.

9. $35 + 7 = $——. $6 \times 7 = $——. $7 \times 6 = $——.

10. $42 + 7 = $——. $7 \times 7 = $——.

11. Count by 7's from 7 to 56.

12. Count backward by 7's from 56 to 7.

13. $35 = $——7's. $49 = $——7's. $56 = $——7's.

14. $9 \times 7 = 8 \times 7 + 7 = 56 + 7 = $——.

15. $10 \times 7 = $——. $7 \times 10 = $——.

16. How many days in 1 week?   In 3 weeks?

17. How many days in 10 weeks?   In 8 weeks?

18. Count by 7's from 7 to 70, and from 70 to 7.

19. Make a multiplication table of 7's, beginning with
$7 \times 1 = 7$,
$7 \times 2 = 14$,
and ending with   20. **Drill Exercise.**
$7 \times 10 = $——.   *Give products quickly.*
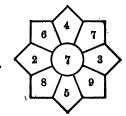
1. In 1 week there are 7 days. In 3 weeks there are —— × 7 days, or —— days.

2. In 14 days there are —— weeks, for there are ——7's in 14.

3. $\frac{1}{7}$ of 28 = ——. $\frac{2}{7}$ of 28 = 2 × ——. $\frac{3}{7}$ of 28 = ——.

4. $\frac{1}{7}$ of 42 = ——. $\frac{2}{7}$ of 42 = ——. $\frac{3}{7}$ of 42 = ——.
$\frac{4}{7}$ of 42 = ——.

5. $\frac{1}{7}$ of 70 = ——. $\frac{1}{7}$ of 63 = ——. $\frac{1}{7}$ of 21 = ——.

6. Draw a diagram of 7 squares in a row and 10 rows. Fill the squares with the multiples of 1, 2, 3, 4, 5, 6, and 7. (See page 44.)

7. Make a division table beginning at 7 in 7, 1, and ending with 7 in 70, 10.

8. **Drill Exercise.**

Give results rapidly.

14 42 56 28 $\frac{1}{7}$ 35 49 21 63

Divide the following numbers by 7, giving quotients and remainders first by columns and then by lines : ——

	A	B	C	D	E	F	G	H	I	J
1.	7	35	14	28	42	21	70	49	63	56
2.	8	38	16	32	43	24	75	53	69	59
3.	11	40	18	29	46	22	72	50	64	62
4.	13	36	15	33	44	27	71	54	66	60
5.	9	39	19	30	47	23	74	51	68	61
6.	12	41	17	34	45	25	73	55	65	58
7.	10	37	20	31	48	26	76	52	67	57

1. Putting several equal numbers together into one product is ——.

2. If each of three boys gives me 32 cents, I shall have in all —— × 32 cents, or —— cents.

3. Separating a number into equal parts is ——.

$$\begin{array}{r} 32 \text{ cents} \\ \times 3 \\ \hline 96 \text{ cents} \end{array}$$

4. If I should divide 96 cents among 3 boys, I should have to separate the money into 3 equal parts, and give each boy $\frac{1}{3}$ of —— cents, or —— cents.

METHOD. — 96 = 9 tens + 6 ones. We say $\frac{1}{3}$ of
3)96 cents   9 tens is 3 tens, which we place under the 9; $\frac{1}{3}$ of
32 cents   6 ones is 2 ones, which we put under the 6. Quotient = 32 cents.

Separate the following numbers into equal parts : —

5. $63 into 3 parts.   **8.** 546 cents into 6 parts.

6. 84 books into 4 piles.   **9.** 427 sticks into 7 piles.

7. 186 boys into 6 groups.   **10.** $637 into 7 parts.

11. How shall we find $\frac{1}{3}$ of 78 ?

WORK   EXPLANATION. — 78 = 7 tens + 8 ones, or 6 tens + 18 ones.
3)78 $\frac{1}{3}$ of 6 tens = 2 tens; $\frac{1}{3}$ of 18 ones = 6 ones. So $\frac{1}{3}$ of 78 = 2
26   tens + 6 ones, or 26. In dividing, we say 3 in 7, 2 times, and 1 remaining; 3 in 18, 6 times. Quotient 26.

12. $\frac{1}{2}$ of 32	**16.** 4 in 64	**20.** 72 ÷ 4	**24.** 2)116
13. $\frac{1}{3}$ of 45	**17.** 5 in 75	**21.** 95 ÷ 5	**25.** 3)138
14. $\frac{1}{4}$ of 56	**18.** 6 in 84	**22.** 96 ÷ 6	**26.** 4)176
15. $\frac{1}{5}$ of 65	**19.** 7 in 91	**23.** 98 ÷ 7	**27.** 6)252

28.	**29.**	**30.**	**31.**	**32.**
2)116	3)138	4)176	6)252	7)154

1. A building lot cost $725 and a house 5 times as much. What did both cost?

2. A farmer has 684 sheep. If he puts an equal number into each of 3 fields, how many in each?

3. A bushel of corn weighs 56 pounds. How many pounds in 4 bushels? In 6 bushels? In 7 bushels?

4. A man divides a farm of 524 acres into 4 equal fields. How many acres in each field?

5. A farmer got 224 bushels of grain from 7 acres. How many bushels did the field average per acre?

6. A man divides $875 among 7 children. What did he give each?

7. If one small engine uses 326 pounds of coal in one day, what will it use in 6 days at this rate?

8. A boy has 7 rows of potatoes. If each row yields 16 bushels, how many bushels will he have?

9. A gardener raised 328 bushels of onions and has sold ¼ of them. How many bushels remain?

10. A man bought 6 building lots at $324 each. What did they all cost him?

11. There are 144 square inches in a square foot. How many square inches in 7 square feet?

12. 396	13. 347	14. 984	15. 397	16. 279
× 7	× 6	× 7	× 5	× 7

17. 7)378   18. 6)144   19. 6)258   20. 7)245   21. 7)395

1. — × — = 35;   — × — = 42;   — × — = 18;
— × — = 27;   — × — = 70.

2. Take ⅙ of 36 from ⅐ of 49.   — is ⅕ of 45.

3. 1 week contains — days; 8 weeks contain — days.

4. 63 days are — weeks, for 63 contains — 7's.

5. How many quarts in 1 gallon?   In 7 gallons?

6. At 7¢ a pound, 9 pounds of sugar cost — ¢.

7. Seven nickels will buy as much as — cents.

8. Forty-five cents are equal to — dimes and — cents.

9. Bought 4 cakes of soap at 7¢ each.   I must give the storekeeper a quarter of a dollar and — cents.

10. A horse-car makes 7 trips a day.   To make 56 trips will require — days. $56 ÷ 7 = $ —.

11. How much less than a half dollar will 9 papers of tacks cost at 5 cents each? $50 - 45 = $ —.

12. Fred Hale can ride 10 miles an hour on his bicycle. In 6 hours he can ride — miles.

13. Add ¼ of 16 to ⅐ of 42.   — × — = 63.

14. ⅐ of 28 is —.   ⅔ of 28 is — times —, or —.

15. Will a half dollar just pay for 7 yards of cotton at 7 cents a yard?

16. What will a 7-pound fish cost at 9¢ a pound?

17. 35 divided by 7 may be written: $35 ÷ 7$, ⅐ of 35, 7)$\overline{35}$, or $\frac{35}{7}$.

18. See how quickly you can get the quotients · $\frac{35}{7}$, $\frac{36}{6}$, $\frac{49}{7}$, $\frac{42}{6}$, $\frac{48}{6}$, $\frac{50}{5}$, $\frac{28}{7}$, $\frac{28}{4}$, $\frac{9}{3}$, $\frac{63}{7}$, $\frac{54}{6}$.

1. Fill the blanks first with 1 and then with 2, 3, 4, 5, 6, and give results quickly.   Thus, 5 × 7 are 35, and 1 is 36.

5 × 7, + —	9 × 7, + —	8 × 7, + —
3 × 7, + —	2 × 7, + —	0 × 7, + —
10 × 7, + —	4 × 7, + —	1 × 7, + —
7 × 7, + —	6 × 7, + —	7 × 7, + —

Give the quotients and remainders : —

2. $\frac{1}{5}$ of 41, $\frac{1}{6}$ of 33, $\frac{1}{4}$ of 29, $\frac{1}{8}$ of 56, $\frac{1}{7}$ of 50.

3. 48 ÷ 5, 46 ÷ 6, 37 ÷ 6, 28 ÷ 3, 46 ÷ 7, 38 ÷ 7.

4. 6)44, 7)52, 7)36, 5)32, 5)42, 4)38.

Written. 1. Give the sum, difference, product, and quotient of 6 and 18 ; 5 and 45 ; 7 and 56 ; 7 and 63.

2. How much would you have in all if you should receive $ 1.35, $ 7.28, $ 3.16, $ 4.72, $ 1.45 ?

3. Together Mary and Ellen have $ 2.15.   If Mary has $ 1.08, how much has Ellen ?

4. Pour 7 pails of water into a tub.   What will it contain if each pail holds 15 quarts ?

5. Separate 147 pencils into 7 equal bundles.   What will each contain ?

Add the products or quotients of : —

6.	7.	8.	9.	10.
23 × 7 }	66 × 7 }	83 × 7 }	217 ÷ 7 }	637 ÷ 7 }
45 × 7 }	75 × 7 }	88 × 7 }	357 ÷ 7 }	567 ÷ 7 }

11. $\frac{1}{7}$ of 49 + $\frac{1}{7}$ of 63 + $\frac{1}{7}$ of 28 + $\frac{1}{7}$ of 56 + $\frac{1}{7}$ of 70 = what ?

12. $\frac{1}{3}$ of 24 + $\frac{1}{4}$ of 36 + $\frac{1}{5}$ of 45 + $\frac{1}{6}$ of 48 + $\frac{1}{7}$ of 21 = what ?

1. Make 2 rows of squares with 8 squares in each row. How many squares in the two rows? $2 \times 8 =$ ———.

2. $16 \div 8 =$ ———. $\frac{1}{8}$ of $16 =$ ———. $16 \div 2 =$ ———. $\frac{1}{2}$ of $16 =$ ———.

3. Three 8's are ———. I find this by counting, or by adding, for $8 + 8 + 8 =$ ———.

4. $\frac{1}{3}$ of $24 =$ ———. $\frac{1}{8}$ of $24 =$ ———. ——— is $\frac{1}{8}$ of 24.

5. $4 \times 8 =$ ———, for $8 + 8 + 8 + 8 =$ ———.

6. $32 \div 8 =$ ———. $\frac{1}{8}$ of $32 =$ ———. $32 \div 4 =$ ———.

7. 5×8 is ——— more than 4×8, or ———, so 5×8 must be ———.

8. I have learned that 8×5 are ——— in a former lesson, so of course 5×8 are ———.

5 rows of 8 each are the same as 8 rows of 5 each.

9. Since 8×6 are ———, 6×8 must be ———.

10. $\frac{1}{5}$ of $40 =$ ———. $\frac{1}{6}$ of $48 =$ ———. $\frac{1}{8}$ of $48 =$ ———.

11. I know that 6×8 are 48, so 7×8 must be ———.

12. $\frac{1}{7}$ of $56 =$ ———. $\frac{1}{8}$ of $56 =$ ———. $56 \div 8 =$ ———.

13. Eight rows of desks with 8 in a row are ——— desks.

14. To get 64 I must add ——— 8's. $8 \times 8 =$ ———.

15. $64 - 56 =$ ———. $56 + $ ——— $= 64$. $7 \times 8 =$ ———.

16. $\frac{1}{8}$ of $56 =$ ———. $\frac{1}{8}$ of $64 =$ ———. $\frac{1}{8}$ of $48 =$ ———.

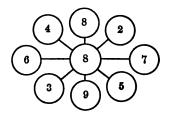17. 9×8 are ———. $\frac{1}{8}$ of $72 =$ ———. $\frac{1}{9}$ of $72 =$ ———.

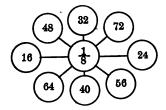18. Draw 80 squares, 8 in a row. Fill the squares with the multiples of 1, 2, 3, 4, 5, 6, 7, and 8. (See p. 44.)

19. Make a division table from $8\overline{)8}$ to $8\overline{)80}$.

Drill Exercises.   *Give results rapidly.*

1. Multiply by 8.   2. Divide by 8.

3. Multiply each of the following numbers by 8 and add 1 to the product.   Give results only; thus, 9, 41, etc.

1	5	7	4	9	2	6	8	10	3

4. Multiply by 8 and add 2 ; add 3 ; add 4 ; add 5.

5. Multiply by 8 and add 6 ; add 7 ; add 8.

6. *Divide the following numbers by* 8, *giving quotients and remainders, first by columns and then by lines :* —

	A	B	C	D	E	F	G	H	I	J
1.	8	40	56	32	72	16	48	64	80	24
2.	9	43	58	35	73	18	52	65	84	28
3.	12	41	61	37	77	21	49	69	87	29
4.	14	46	60	33	75	17	53	66	83	25
5.	10	42	59	38	79	22	50	70	86	30
6.	13	45	63	34	76	19	54	67	82	26
7.	11	47	62	39	74	23	51	71	85	31
8.	15	44	57	36	78	20	55	68	81	27

Add the numbers from 1 to 9 inclusive to each number in the following table.   Add by columns and by rows.

	A	B	C	D	E	F	G	H	I
1	13	64	50	90	85	48	89	54	25
2	74	91	33	20	63	16	72	78	10
3	38	19	79	39	34	67	40	24	53
4	56	32	92	14	57	26	35	88	43
5	37	81	49	93	36	52	17	23	77
6	51	15	96	59	27	83	65	99	68
7	31	61	69	29	95	21	94	42	84
8	70	87	28	98	18	41	55	80	75
9	58	60	97	46	82	62	22	12	66
10	47	11	71	30	86	73	45	76	44

Subtract all the numbers from 1 to 9 inclusive from each number in the table.   Subtract by columns and by rows.

Observe that on page 42 we subtracted any number less than 100 ending in a zero from other numbers of two orders.   Now we have subtracted numbers from 1 to 9 from the same kind of numbers.   Then if we are to take 36 from 93, it is easier to think 30 from 93, 63; 6 from 63, 57.   *In this way give the following at sight:* —

1.	$92 - 54$	$52 - 29$	$51 - 19$	$82 - 17$
2.	$67 - 28$	$71 - 46$	$64 - 47$	$63 - 19$
3.	$96 - 47$	$93 - 78$	$80 - 56$	$82 - 39$
4.	$56 - 38$	$82 - 64$	$91 - 77$	$62 - 47$

1. $\frac{1}{2}$ of 6 books = ———. $\frac{1}{3}$ of 12 eggs = ———.

2. If I separate 20 cents into 4 equal parts, there will be ——— cents in each part. $\frac{1}{4}$ of 20 = ———.

3. In a dollar there are ——— quarters.

4. A pint is ——— of a quart. $\frac{1}{2}$ of 2 pints is ——— pint.

5. A quart is what part of a gallon ?

6. We may separate a number into equal parts by division.   To separate a number into 2 equal parts is to find ——— of it.

7. To separate a number into 3 equal parts is to find ——— of it.   To separate a number into 4 equal parts is to find ——— of it.

8. We may also separate *a single thing* into equal parts. Thus we may cut a circle into 2 equal parts to get ——— of it.   2 halves of anything equal a whole one. $\frac{1}{2} + \frac{1}{2} = 1$.

9. We divide a thing into 3 equal parts to get ——— of it. $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = $ ———.

10. We divide a thing into ——— equal parts to get $\frac{1}{4}$ of it. $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = $ ———.

11. In 1 there are ——— *halves*, ——— *thirds*, or ——— *fourths*.

One or more of the equal parts of a thing is a **fraction**.

1. When $\frac{1}{2}$ dozen oranges are worth 20¢, what are a dozen worth?

2. When $\frac{1}{4}$ of a gallon of milk is worth 5¢, what is a gallon worth?

3. $1 = \frac{?}{2}$. $\frac{1}{2} + \frac{1}{2} = $ ———. $1 = \frac{?}{4}$. $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = $ ———.

4. $\frac{1}{4} + \frac{1}{2} = \frac{?}{4}$; $\frac{1}{2} - \frac{1}{4} = $ ———; $1 - \frac{1}{4} = $ ———; $1 - \frac{1}{2} = $ ———.

5. $1\frac{1}{2} + 2\frac{1}{2} + 3 = 7$.

(EXPLANATION. — $\frac{1}{2} + \frac{1}{2} = 1,\ 1 + 1 + 2 + 3 = 7$.)

6. *Add :* —

WORK

$\begin{array}{r} 3 \\ 2\frac{1}{2} \\ 4\frac{3}{4} \\ 5\frac{1}{4} \\ \hline 15\frac{1}{2} \end{array}$

EXPLANATION. — $\frac{1}{4} + \frac{3}{4} = \frac{4}{4} = 1$, $1 + \frac{1}{2} = 1\frac{1}{2}$. $\frac{1}{2}$ is written and the 1 added to the whole numbers. 1 (from $\frac{1}{4} + \frac{3}{4}$) $+ 5 + 4 + 2 + 3 = 15$.

7. $\begin{array}{r} 3 \\ 2\frac{1}{2} \\ 1\frac{1}{2} \\ 3\frac{1}{4} \\ \hline \end{array}$ **8.** $\begin{array}{r} 1\frac{1}{4} \\ 2\frac{1}{4} \\ 3\frac{1}{2} \\ 4 \\ \hline \end{array}$ **9.** $\begin{array}{r} 6\frac{1}{4} \\ 7\frac{3}{4} \\ 2\frac{1}{2} \\ 3\frac{1}{2} \\ \hline \end{array}$ **10.** $\begin{array}{r} 3\frac{1}{4} \\ 2\frac{1}{2} \\ 1\frac{1}{2} \\ 4 \\ \hline \end{array}$

11. Subtract $3\frac{1}{4}$ from $7\frac{1}{2}$.

WORK

$\begin{array}{r} 7\frac{1}{2} \\ 3\frac{1}{4} \\ \hline 4\frac{1}{4} \end{array}$

EXPLANATION. $\frac{1}{2} - \frac{1}{4} = \frac{1}{4}$. $7 - 3 = 4$. Hence $7\frac{1}{2} - 3\frac{1}{4} = 4\frac{1}{4}$.

12. $\begin{array}{r} 9\frac{3}{4} \\ -2\frac{1}{2} \\ \hline \end{array}$ **13.** $\begin{array}{r} 7\frac{1}{2} \\ -6\frac{1}{4} \\ \hline \end{array}$ **14.** $\begin{array}{r} 8\frac{3}{4} \\ -6 \\ \hline \end{array}$ **15.** $\begin{array}{r} 10\frac{3}{4} \\ -2\frac{1}{2} \\ \hline \end{array}$

1. $\frac{1}{8}$ of 56 is ——.   —— × —— = 64; —— × —— = 72.

2. I paid $48 for 8 tons of coal.   This was —— dollars a ton.   8 × $6 = $——.   When a ton costs $6, 7 tons will cost ——.

3. There are —— 8's in 32.   4 pk. = —— qt.

4. $\frac{1}{8}$ of 72 is ——; $\frac{2}{8}$ of 72 = 2 × ——, or ——; $\frac{3}{8}$ of 72 = ——.

5. 40 gallons will fill an 8-gallon jug —— times.

6. $\frac{1}{8}$ of 72 cents added to $\frac{1}{8}$ of 32 cents = —— cents.

7. With a silver quarter I can buy —— pounds of sugar at 8 cents a pound, and have left ——.

8. Henry sold 2 qt. of milk for 16 cents; that was —— cents a quart.   He ought to get —— cents for 10 quarts.

9. $\frac{1}{8}$ of 56 less $\frac{1}{8}$ of 32 is ——.   6 times $\frac{1}{2}$ of 16 is ——.

10. A dime, a nickel, and a quarter = —— cents.

Fill the first blank with any multiple of 8.

11. When 8 pounds of rice cost —— cents, 1 pound will cost $\frac{1}{8}$ of —— cents, or —— cents; 7 pounds will cost —— × —— cents, or —— cents.

Written.   *Find the difference between these products and quotients :* —

1. 4 × 29	2. 6 × 94	3. 648 ÷ 8	4. 78 × 8
88 ÷ 8	728 ÷ 8	287 ÷ 7	65 × 6
5. 512 ÷ 8.	9. 764 − 636, ÷ 8.		13. $\frac{1}{6}$ of 144.
6. 584 ÷ 8.	10. 988 − 116, ÷ 8.		14. $\frac{1}{8}$ of 144.
7. 776 ÷ 8.	11. 349 + 427, ÷ 8.		15. $\frac{1}{4}$ of 144.
8. $\frac{1}{7}$ of 595.	12. 45 × 8, × 7.		16. $\frac{1}{7}$ of 343.

Dry Measure

We measure dry articles, like
potatoes, oats, and corn, by the
peck or **bushel**.

  1 peck   = 8 quarts

  1 bushel (bu.) = 4 pecks (pk.)

1. In 1 pk. there are —— qt. ;
in 2 pk. there are $2 \times$ —— qt., or ——.

2. 3 pk. $= 3 \times$ —— qt.; 4 pk. $= 4 \times$ —— qt.; 5 pk. $=$ —— qt.

3. $\frac{1}{2}$ pk. $=$ —— qt.; $\frac{1}{4}$ pk. $=$ —— qt.; $1\frac{1}{2}$ pk. $=$ —— qt.

4. At 8¢ a quart, a peck of hickory nuts will cost
—— $\times 8¢$, or —— ¢.

5. A basket that holds 3 bu. holds —— pk.

6. In $3\frac{1}{2}$ bu. how many pecks ?

7. If I feed my horse a peck of oats a day, how long
will 6 bushels last him ?

8. 10 cents a peck is how much per bushel ?

9. At 48 cents a peck, what will a quart of beans cost ?

Written.   **1.** When strawberries are selling at 8¢ a
quart, what is a bushel crate worth ?

2. When potatoes are selling at $1.20 per bushel, what
ought I to pay for a peck ?

3. When I give my horse 2 quarts of oats at a feed,
how many feeds will a bushel make ?

4. A dealer buys berries at $2 a bushel and sells them
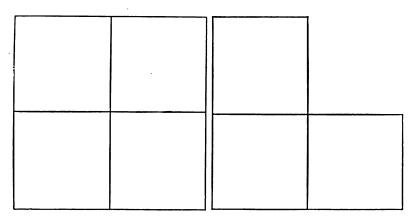at 8¢ a quart. What does he gain on 7 bushels ?

1. Henry gathered 2 bushels of chestnuts which he sold at 5¢ a quart. What did he receive for them?

2. When I pay 6¢ a quart for plums, what is that a bushel? What should I pay for 8 bushels?

3. 40 cents a peck is how much a bushel? How much a quart?

4. How many pecks in a barrel of $2\frac{1}{2}$ bushels?

5. A boy gathered a bag of $2\frac{1}{4}$ bushels of hazelnuts and sold them at 8 cents a quart. What did he receive for them?

6. When peaches are 45 cents a peck, what will 7 bushels cost?

7. A merchant buys beans for $1.60 per bushel and sells them at 7¢ a quart. What will he make on 8 bushels?

8. At 4 quarts of oats a feed, how many feeds in a bushel? How many feeds in 8 bushels?

9. Henry sold 16 3-peck baskets of pears at $3 per bushel. What did he receive?

10. If 2 pecks of potatoes will last a family a week, how many bushels will they use in 20 weeks?

11. 45 pecks are how many bushels and how many pecks over?

12. 100 quarts are how many pecks and how many quarts over?

13. 5 bushels and 3 pecks = —— × 4 pecks + 3 pecks = ——.

14. 8 bu. + 2 pk. = —— pk.   30 pk. = —— bu. + —— pk.

1. Compare 5 and 15; thus 5 is $\frac{1}{3}$ of 15; 15 is three times 5.

2. Compare 6 and 18; 6 and 24; 6 and 30; 6 and 36.

3. Compare 7 and 21; 7 and 35; 7 and 42; 7 and 56.

4. Compare 8 and 16; 8 and 24; 8 and 32; 8 and 40.

5. When 6 quarts of cherries are worth $1, what are 18 quarts worth? $18 = ---- \times 6$.

6. When 4 oranges cost 10 cents, what will 12 cost?

7. At 5 apples for 8 cents, what will 20 cost?   ·

8. At 6 oranges for 25 cents, what will 24 cost?

Written

NOTE. — Lead the pupil to see that it is needless to find the cost of 1 in problems like the following.

1. When 7 tons of coal cost $52.50, what will 21 tons cost?

2. When 8 acres of wheat produce 240 bushels, what may a farmer expect from 40 acres?

3. When 7 hens are worth $3.92, what ought I to pay for a flock of 28?

4. A farmer has a young orchard containing 42 trees. He has gathered 54 bushels from 7 of the trees. How many bushels may he expect from the whole orchard?

5. The wages of 8 men for 1 day were $18. At this rate what should 56 men receive?

6. In rowing 3 miles a man made 420 strokes with the oars. How many strokes will he make at this rate in 21 miles?

1. A 1-inch square is what part of a 2-inch square?

2. 2 square inches are what part of a 2-inch square?

3. Compare $\frac{1}{2}$ of a 2-inch square with $\frac{1}{4}$ of the same square.

4. How many cents in a half-dollar?

5. Compare $\$\frac{1}{2}$ and $\$\frac{1}{4}$.

6. $\frac{1}{2}$ gal. = —— qt.; $\frac{1}{4}$ gal. = —— qt.

7. $\frac{1}{2}$ ft. = —— inch; $\frac{1}{4}$ ft. = —— inch.

8. Which is the larger, $\frac{1}{2}$ or $\frac{1}{4}$? $\frac{1}{2}$ = —— × $\frac{1}{4}$; $\frac{1}{4}$ = $\frac{1}{2}$ of ——.

9. How many halves in an apple? How many fourths?

10. $1 = \frac{1}{2} + \frac{1}{2}$; $1 = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$. $\frac{1}{2} + \frac{1}{4} = \frac{?}{4}$.

11. If I have a pie and eat $\frac{1}{4}$ of it, how much remains?

12. $\frac{1}{4}$ of an orange taken from $\frac{1}{2}$ of the orange leaves ——.

13. $\frac{1}{2} - \frac{1}{4}$ = ——. $1 - \frac{1}{4}$ = ——. $1 - \frac{1}{2}$ = ——.

Copy and complete these exercises : —

1.	**2.**	**3.**	**4.**
$6 \times \rule{1cm}{0.4pt} = 48$	$24 - \rule{1cm}{0.4pt} = 15$	$8 \times \rule{1cm}{0.4pt} = 72$	$\rule{1cm}{0.4pt} \times \rule{1cm}{0.4pt} = 28$
$54 \div 6 = \rule{1cm}{0.4pt}$	$7 \times \rule{1cm}{0.4pt} = 42$	$\rule{1cm}{0.4pt} \div 8 = 10$	$36 = \rule{1cm}{0.4pt} \times \rule{1cm}{0.4pt}$
8 is $\frac{1}{8}$ of $\rule{1cm}{0.4pt}$	$\rule{1cm}{0.4pt} \times \rule{1cm}{0.4pt} = 63$	$\rule{1cm}{0.4pt} - 16 = 9$	$63 \div 7 = \rule{1cm}{0.4pt}$
7 in $\rule{1cm}{0.4pt} = 4$	$\rule{1cm}{0.4pt} - 8 = 31$	5 is $\frac{1}{6}$ of $\rule{1cm}{0.4pt}$	$\frac{1}{7}$ of 15 is 3
$19 + \rule{1cm}{0.4pt} = 26$	$\frac{1}{7}$ of $63 = \rule{1cm}{0.4pt}$	8 is $\frac{1}{7}$ of 32	$\frac{2}{5}$ of 20 is $\rule{1cm}{0.4pt}$

Add these products and quotients : —

5.	**6.**	**7.**	**8.**
$7 \times 80 =$	$8 \times 80 =$	$168 \div 8 =$	$630 \div 7 =$
$6 \times 70 =$	$8 \times 90 =$	$200 \div 5 =$	$720 \div 8 =$
$8 \times 40 =$	$7 \times 60 =$	$246 \div 6 =$	$648 \div 8 =$
$5 \times 90 = \underline{\quad}$	$6 \times 90 = \underline{\quad}$	$490 \div 7 = \underline{\quad}$	$637 \div 7 = \underline{\quad}$

9. $79 + 79 + 79 + 79 + 79 + 79 + 79 + 79 =$ what? In what other way can you find it?

10. $8 \times 62 = ?$ **13.** $728 \div 8 = ?$ **16.** $37 \times 8, -119 = ?$

11. $74 \times 8 = ?$ **14.** $\frac{1}{8}$ of $328 = ?$ **17.** $32 \times 6, +8 = ?$

12. $248 \div 8 = ?$ **15.** $8 \times 327 = ?$ **18.** $\frac{1}{8}$ of $592, \times 3 = ?$

19. If you receive $18 \not\!c$, $25 \not\!c$, $34 \not\!c$, and $28 \not\!c$, and spend 3 dimes, how many cents will you have left?

20. What will 8 horses cost when one horse costs $\$137$?

21. 776 apples are in 8 baskets. How many are there in each basket?

1. $1\frac{1}{2}$ is read *one and one half*. $1\frac{1}{2} \times 6$ means once 6 added to $\frac{1}{2}$ of 6. Then $1\frac{1}{2} \times 6 =$ ——.

2. $2\frac{1}{3}$ yards of cloth at 9 cents a yard will cost —— cents, plus —— cents or ——.

3. $1\frac{1}{4}$ pounds of coffee at 20 cents a pound will cost —— cents plus —— cents or ——.

4. $1\frac{1}{6}$ dozen eggs at 18 cents a dozen are worth ——.

5. $1\frac{1}{2}$ dozen oranges at 20 cents a dozen are worth ——.

6. Charles has 24 marbles and James $1\frac{1}{6}$ times as many. How many has James?

7. There are 16 ounces in a pound. In $1\frac{1}{8}$ pounds there are —— ounces.

Written. **1.** What are $3\frac{1}{5}$ times 45?

WORK

$$
\begin{array}{r}
45 \\
3\frac{1}{5} \\
\hline
9 \\
135 \\
\hline
144
\end{array}
$$

EXPLANATION. — $3\frac{1}{5} \times 45$ means $\frac{1}{5}$ of 45 added to 3×45. $\frac{1}{5}$ of 45 is 9. $3 \times 45 = 135$. $9+135=144$, hence $3\frac{1}{5} \times 45 = 144$.

2. 48	**3.** 72	**4.** 63	**5.** 45	**6.** 75
$\times 7\frac{1}{6}$	$\times 6\frac{1}{8}$	$\times 5\frac{1}{7}$	$\times 7\frac{1}{5}$	$\times 8\frac{1}{5}$
7. 84	**8.** 72	**9.** 96	**10.** 72	**11.** 84
$\times 6\frac{1}{4}$	$\times 8\frac{1}{6}$	$\times 4\frac{1}{6}$	$\times 7\frac{1}{3}$	$\times 8\frac{1}{3}$

12. What is the cost of $7\frac{1}{8}$ pounds of tea at 32 cents a pound?

13. What is the cost of $5\frac{1}{4}$ pounds at 36 cents a pound?

1. 3261   2. 832   3. 968   4. 10,365   5. 7265
   $\times 7$ $\times 8$ $\times 6$ $\times 7$ $\times 3$

6. 5×347 10. 8×735 14. 3×789

7. 6×931 11. 7×962 15. 6×478

8. 7×836 12. 4×876 16. 8×891

9. 4×989 13. 5×643 17. 6×783

18. $3\overline{)564}$ 20. $4\overline{)964}$ 22. $5\overline{)750}$ 24. $6\overline{)954}$

19. $8\overline{)920}$ 21. $6\overline{)834}$ 23. $7\overline{)364}$ 25. $6\overline{)354}$

To find a part of a number

To divide 320 by 8 is to find one of the eight equal parts of 320 or $\frac{1}{8}$ of 320. $\frac{3}{8}$ of 320 means 3 times one of the 8 equal parts of 320. $\frac{3}{8}$ is read *three eighths.*

26. To find $\frac{3}{8}$ of 96.

WORK

$8\overline{)96}$
$\;\;\overline{12}$
$\;\;\;\underline{3}$
$\;\;\overline{36}$

EXPLANATION. — $\frac{3}{8}$ of 96 is equal to 3 times $\frac{1}{8}$ of 96. $\frac{1}{8}$ of 96 is 12, then $3 \times 12 = 36$, hence $\frac{3}{8}$ of $96 = 36$.

27. $\frac{3}{7}$ of $357 =$ 31. $\frac{5}{6}$ of $486 =$ 35. $\frac{7}{8}$ of $\;\;672 =$

28. $\frac{4}{5}$ of $385 =$ 32. $\frac{3}{8}$ of $464 =$ 36. $\frac{2}{5}$ of $1230 =$

29. $\frac{2}{7}$ of $910 =$ 33. $\frac{5}{8}$ of $960 =$ 37. $\frac{3}{8}$ of $1264 =$

30. $\frac{2}{5}$ of $360 =$ 34. $\frac{5}{7}$ of $392 =$ 38. $\frac{2}{7}$ of $1260 =$

1. $\frac{3}{5}$ of $260 means that we are to find 3 times $\frac{1}{5}$ of $260. $\frac{1}{5}$ of $260 = —. 3 × $52 = —.

2. What will $\frac{7}{8}$ of an acre cost at $240 per acre?

WORK

$$8)\$240$$
$$\$30 = \tfrac{1}{8} \text{ of } \$240$$
$$7$$
$$\overline{\$210} = \tfrac{7}{8} \text{ of } \$240.$$

3. I paid $3200 for a house. When I sold it I gained $\frac{2}{5}$ of what it cost. Find the gain. Find the selling price.

4. $2\frac{3}{4} \times \$32$ means $2 \times \$32 + \frac{3}{4}$ of $32.

WORK
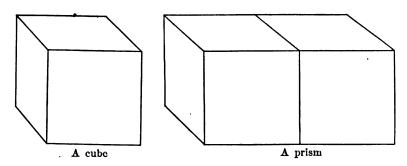
$$\$32$$
$$2\tfrac{3}{4}$$
$$\overline{\$64} = 2 \times \$32$$
$$24 = 3 \times \tfrac{1}{4} \text{ of } \$32$$
$$\overline{\$88}$$

5. Find $3\frac{2}{5} \times 65$ bushels.

6. Find $7\frac{1}{2} \times 96$ acres.

7. Find $6\frac{3}{4} \times 48$ quarts.

8. Find $8\frac{3}{5} \times 75$ miles.

9. Find $7\frac{5}{6} \times 36$ feet.

10. Find the cost of $4\frac{3}{4}$ pounds of butter at 28¢ per pound.

11. Find the cost of $6\frac{1}{2}$ pounds of tea at 90¢ per pound.

12. 72
   $\times 5\frac{3}{4}$
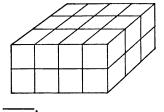
13. 65
   $\times 7\frac{2}{5}$

14. 45
   $\times 6\frac{2}{3}$

15. 72
   $\times 5\frac{3}{4}$

16. 75
   $\times 6\frac{3}{5}$

17. 93
   $\times 8\frac{2}{3}$

18. 84
   $\times 5\frac{3}{4}$

19. 63
   $\times 7\frac{1}{3}$

20. 96
   $\times 8\frac{1}{4}$

21. 84
   $\times 8\frac{3}{4}$

22. 63
   $\times 5\frac{2}{7}$

23. 48
   $\times 7\frac{5}{6}$

24. 72
   $\times 7\frac{3}{8}$

25. 84
   $\times 6\frac{2}{7}$

26. 48
   $\times 4\frac{7}{8}$

A cube   A prism

1. A block each of whose *six faces* is a *square* is a **cube**. If the faces are square inches, the cube is called a **cubic inch**, or a one-inch cube.

2. Put 2 one-inch cubes together and you have a **prism**. Give the dimensions of each face of the prism.

3. Place two prisms made from 2 one-inch cubes together. How many cubic inches are there? What are the dimensions of the second prism?

4. $\frac{1}{2}$ of a prism 2 inches long, 2 inches wide, and 1 inch thick is how many cubic inches? $\frac{1}{4}$ of the prism is how many cubic inches?

5. Make a prism of 3 one-inch cubes. Place two such prisms together. How many cubic inches in all? What are the dimensions of the second prism?

6. Build a 2-inch cube from one-inch cubes. How many one-inch cubes in the bottom layer? How many such layers? How many cubic inches in all?

7. A one-inch cube is what part of a two-inch cube?

8. 2 cubic inches are what part of a 2-inch cube?

1. How many cubes in one row of the first layer of the prism here represented?

2. How many such rows? Then how many cubes in the upper layer? 3×4 cubic inches = ———.
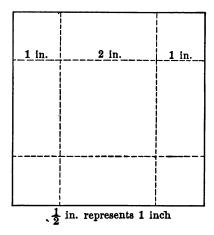
3. How many such layers in the whole prism? Then how many cubes in the whole prism? 2×12 cubic inches = ———.

4. How many cubes in $\frac{1}{2}$ of this prism?

5. How many in $\frac{1}{4}$ of it?

6. Which is more, $\frac{1}{4}$ of it, or $\frac{1}{2}$ of it?

7. From 1-inch cubes make a prism 3 inches wide, 1 inch deep, and 6 inches long. How many cubic inches did it take?

8. How many cubes will it take to make a layer three inches wide and 8 inches long? How many in 3 such layers?

9. If I place 24 cubes in a layer 4 inches wide, how long is it?

10. It takes 42 cubic inches to fill my pencil box. How deep is it if the bottom layer is 3 inches wide, and 7 inches deep?

11. How many 1-foot cubes will fill a box 2 feet deep, 2 feet wide, and 6 feet long?

1. How many cubic inches will it take to build a prism 5 inches wide, 7 inches long, and 8 inches high?

SUGGESTION.— How many in the bottom layer? How many such layers?

SOLUTION. — 8 × 35 cubic inches = 280 cubic inches.

2. How many cubic inches will a box hold if it is 6 inches deep, 7 inches wide, and 10 inches long?

3. How many cubic feet in a pile of wood 4 feet wide, 12 feet long, and 8 feet high?

4. A box is 6 inches wide, 7 inches long, and 3 inches deep. How many one-inch cubes will it hold?

5. Make a diagram like the one in the margin. Fold on the dotted lines and make a box. How many cubic inches will it hold? (Cut out the corners.)

6. Make a box 3 inches wide and 4 inches long that will hold 24 cubic inches. How high must it be?

| 1 in. | 2 in. | 1 in. |

$\frac{1}{2}$ in. represents 1 inch

7. Make a box that will hold a 3-inch cube. How many cubic inches in a 3-inch cube?

8. How many cubic feet in a bin 6 feet wide, 7 feet long, and 8 feet deep?

1. Compare 8 and 48, thus 8 is $\frac{1}{6}$ of 48 ; 48 is 6 times 8.
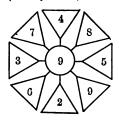
2. Compare 35 and 7 ; 36 and 6 ; 7 and 63.

3. Compare 4 quarts with 1 bushel; 2 quarts with 1 peck.

4. What will 14 pints of milk cost at 6 cents a quart ?

5. 14 pecks are the same as —— bushels and —— pecks, for —— pecks make 1 bushel.

6. 17 pints will fill —— one-quart pans and —— will remain.

7. A barrel will hold $2\frac{1}{2}$ bushels or —— pecks.

8. At 10 cents a peck, a bushel of apples will cost —— × 10¢, for there are —— pecks in a bushel.

9. $2\frac{1}{2}$ gallons of milk will fill —— quart bottles, for there are —— quarts in a gallon and —— qts. in $2\frac{1}{2}$ gals.

Written. *Add rapidly, first upward, then downward :* —

1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**
13	20	24	27	75	70	64
28	32	42	60	69	95	91
49	56	59	99	89	84	80
15	21	25	76	72	68	63
30	36	45	98	96	93	97
54	57	48	90	87	81	28

NOTE. — In adding, say as few words as possible. In the first column of exercise 1, say 4, 9, 18, 26, 29 or 3, 11, 20, 25, 29, as you see the figures.
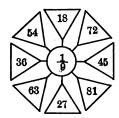
8. 924	**9.** 924	**10.** 793	**11.** 836	**12.** 757
− 786	− 629	− 587	− 793	− 581

1. When I add 2 nines I get ——, then $2 \times 9 =$ ——. I know this in another way, for 9×2 are ——; so of course $2 \times 9 =$ ——.

2. I can find 3×9 by adding —— —— or from —— × ——; then $3 \times 9 =$ ——.

3. $9 + 9 + 9 + 9 =$ ——. $4 \times 9 =$ ——. $\frac{1}{9}$ of $36 =$ ——. $\frac{1}{4}$ $36 =$ ——.

4. $\frac{1}{3}$ of $27 =$ ——. $\frac{1}{9}$ of $27 =$ ——. $\frac{1}{9}$ of $18 =$ ——.

5. $36 + 9 =$ —— or —— 9's. $\frac{1}{9}$ of $45 =$ ——. $\frac{1}{5}$ of $45 =$ ——.

6. $45 + 9 =$ —— or —— 9's. $\frac{1}{9}$ of $54 =$ ——. $\frac{1}{6}$ of $54 =$ ——.

7. $9 \times 7 =$ ——, so $7 \times 9 =$ ——. $\frac{1}{9}$ of $63 =$ ——. $\frac{1}{7}$ of $63 =$ ——.

8. $8 \times 9 = 7 \times 9, + 9$ or ——. $\frac{1}{9}$ of $72 =$ ——.

9. $9 \times 9 = 9$ more than 8×9, and so must be ——.

10. $10 \times 9 =$ ——. $\frac{1}{9}$ of $90 =$ ——.

11. At $10 \not{c}$ each, 9 balls will cost ——, for $9 \times 10 \not{c} =$ ——.

12. Seven slates at $9 \not{c}$ each would cost —— × $9 \not{c}$ or —— $\not{c}$.

13. If I divide $90 \not{c}$ among 9 girls, each girl will have —— cents, for $\frac{1}{9}$ of $90 \not{c}$ is ——.

14. Draw 90 squares, by drawing 9 rows of 10 squares each. Fill the squares with the multiples you have learned. (See p. 44.)

Drill Exercises.

Give results rapidly.

Divide these numbers by 9, first by columns and then by lines, giving quotients and remainders : —

	A	B	C	D	E	F	G	H	I	J
1.	9	90	18	54	81	63	45	36	72	27
2.	10	95	22	58	82	68	46	37	77	36
3.	14	91	25	59	87	64	51	40	81	31
4.	11	96	19	55	83	69	47	44	76	35
5.	15	92	23	60	88	65	52	38	80	30
6.	12	97	26	63	84	70	48	41	75	34
7.	16	93	20	56	89	66	53	42	79	29
8.	13	98	24	61	85	71	49	39	74	33
9.	17	94	27	62	90	67	54	43	78	28
10.	18	99	21	57	86	72	50	45	73	32

11. *Fill the — with 1, 2, 3, 4, 5, 6, 7, 8, 9 in succession, and give results quickly.* Thus, 5 times 9 are 45 and 1 is 46.

$5 \times 9, + $ —— $7 \times 9, + $ —— $4 \times 9, + $ —— $5 \times 8, + $ ——

$3 \times 9, + $ —— $9 \times 9, + $ —— $6 \times 9, + $ —— $1 \times 9, + $ ——

$10 \times 9, + $ —— $2 \times 9, + $ —— $8 \times 9, + $ —— $7 \times 9, + $ ——

Copy and complete : —

1. —— $\times$ —— $= 63$.

2. $9 \times$ —— $= 54$.

3. $2 \times 3 \times 3 = $ ——.

4. $\frac{1}{7}$ of $49 = $ ——.

5. 8 is $\frac{1}{7}$ of ——.

6. $72 \div 9 = $ ——.

7. $45 \div$ —— $= 9$.

8. —— $\times$ —— $= 64$.

9. $37 + 18 = $ ——.

10. $63 - 17 = $ ——.

11. $\frac{1}{8}$ of $64 = $ ——.

12. $\frac{1}{9}$ of $63 = $ ——.

13. $\frac{1}{7}$ of —— $= 8$.

14. $\frac{1}{9}$ of —— $= 9$.

15. $\frac{1}{7}$ of —— $= 9$.

1. The sides of a triangle are each 9 inches long; the distance around the triangle is —— inches. 3×9 inches are ——.

2. Each side of a square is 9 inches long; the distance around it is —— times 9 inches, or —— inches.

3. With twenty cents I can buy —— 9-cent books and have —— cents left. —— $\times 9$, $+$ —— $= 20$.

4. Fill the first —— with 2, 3, 4, 5, 6, 7, 8, or 9. When rice costs 9 cents a pound, for —— pounds I must pay —— $\times 9$ cents, or —— cents.   .

5. $\frac{1}{9}$ of $72 + \frac{1}{8}$ of 64 are ——; 6 is $\frac{1}{9}$ of ——.

6. If my pail holds 9 quarts, I must carry —— pailfuls to fill a vessel holding 81 quarts.

7. How many quarts in a peck? In 9 pecks?

8. I know there are —— days in 9 weeks, because 9 weeks contain 9 times as many days as ——.

9. Charlie is 9 years old, and his father is 4 times as old; so his father must be —— years old.

10. Add 7 9's together, and we have ——, for $7 \times 9 =$ ——.

11. Take 4×8 from 36, and —— will be left.

12. Fill the first blank with 27, 36, 54, 63, 81, 72, or 45. When milk is $9 \cent$ a quart, for —— cents I can buy —— quarts, for there are —— 9's in ——.

13. $\frac{1}{9}$ of 18 is ——; $\frac{2}{9}$ of $18 = 2 \times$ ——, or ——; $\frac{5}{9}$ of $18 =$ ——.

1. A farmer had 279 sheep and bought 369 more. He then sold $\frac{1}{3}$ of all he had. How many had he left?

2. A grocer buys butter at 19¢ and sells it for 26¢. What will he gain on 9 pounds?

3. A man's yearly salary is $1350. His expenses are $956. How much can he save in 8 years?

4. Eight stoves cost a dealer $280. What was this for each?

5. A dealer paid $210 for 6 stoves. At what price each must he sell them to gain $120?

6. A trader bought 9 horses at $126 each. What did they cost him?

7. A farmer sold 9 bushels of potatoes at 85¢ per bushel and 8 dozen eggs at 23¢ per dozen. What did he get for all?

8. A man had 378 sheep and bought 269 more. He then sold 576. How many had he left?

9. A lady bought 9 yards of cloth for a suit at $2.48 per yard. What did it cost her?

10. Add: 379, 468, 971, 389, 763, 244.

11. How many bushels in 472 pecks?

12. A man has a farm of 360 acres. $\frac{2}{5}$ of it is in wheat. How many acres are in wheat?

13. A western farmer has 560 acres in wheat. He has harvested $\frac{3}{7}$ of it. How many acres yet to harvest?

14. Find $\frac{2}{7}$ of $287 + \frac{5}{6}$ of 432.

1. Put $1.72, $3.87, $4.95, $3.87, and $2.75 together into one sum.

2. Find the remainder when $3.67 is taken out of $8.41.

3. When 87 quarts is the multiplicand and 9 is the multiplier, what is the product?

4. What is the quotient when 9 is the divisor and $864 is the dividend?

5.	6.	7.	8.	9.
$2.89 +	$6.75 +	$1.23 +	$0.97 +	$7.89 +
3.89	5.67	2.45	1.45	7.89
4.89	7.65	3.67	2.09	7.89
5.89	6.57	4.89	1.37	7.89
3.98	7.56	5.78	3.29	7.89

10.	11.	12.	13.	14.
$4.28	$3.91	$6.42	$11.84	$6.21
− 3.76	− 1.38	− 2.75	− 8.95	− 5.17

15.	16.	17.	18.	19.
$235	$467	$859	$475	$832
× 7	× 8	× 9	× 9	× 8

20.	21.	22.	23.	24.
9)342	9)486	9)594	9)693	9)873

25.	26.	27.	28.	29.
$268	$592	$785	$896	$890
× $7\frac{1}{4}$	× $6\frac{1}{4}$	× $7\frac{1}{5}$	× $9\frac{1}{7}$	× $8\frac{1}{5}$

1. *Add each number to the one at the right; to the one below it.*

Thus: $56 + 25$.   Think $56 + 20 = 76$, $76 + 5 = 81$; but say 56 and 25, 81.

	A	B	C	D	E	F	G	H
I	28	35	36	48	28	34	41	36
J	42	56	53	19	46	37	37	19
K	63	24	67	18	53	38	46	29
L	48	37	81	16	47	39	72	19
M	54	39	39	49	52	28	63	2

2. *Find the difference between each number and the one below it;*

3. *between each number and the one at the right of it.*

Thus: $53 - 28$.   Think $53 - 20 = 33$, $33 - 8 = 25$; but say 28 from 53, 25.

Give at sight first the sums, then the differences : —

1.	2.	3.	4.	5.	6.
52	41	64	43	54	33
19	28	29	27	37	16

7.	8.	9.	10.	11.	12.
64	57	46	52	44	36
26	39	27	39	19	29

13.	14.	15.	16.	17.	18.
72	64	73	57	63	51
19	28	17	28	24	39

1. If 3 oranges cost 5¢, 6 will cost —— × 5¢, for 6 = —— × 3.

2. When 2 pencils cost 5¢, 8 will cost —— × 5¢, or ——.

3. When 3 pencils cost 10¢, that is —— cents a dozen, for 12 = —— × 3, and —— × 10¢ = ——.

4. If 2 quarts of cream will serve 7 people, 6 quarts will serve ——, for 6 = —— × 2, and —— × 7 = ——.

5. Henry rode his bicycle 9 miles in 2 hours. At this rate how far can he ride in 4 hours? In 6 hours? In 8 hours?

6. Four bananas for 15¢ is —— cents per dozen.

7. When 4 cost 15¢, 8 will cost —— cents. 16 will cost ——.

8. When 12 eggs cost 18¢, 4 will cost —— of 18¢, or ——.

Written

1. When 7 tons of coal cost $ 57.40, what will 14 tons cost? What will 21 tons cost?

2. When 18 quarts of milk cost $ 1.26, what will 9 quarts cost? 6 quarts? 3 quarts?

3. When 12 quart baskets of berries are worth $ 1.50, what should I get for 24 quarts? For 36 quarts?

4. When 8 melons are sold for $ 3.20, what will 4 cost? What will 16 cost? What will 24 cost?

5. If a boy can fill a 16-quart crate of berries in 6 hours, how long will it take to fill an 8-quart crate? How long will it take to fill a 24-quart crate?

1. When ½ pound of tea is worth 40¢ what should I pay for ¼ pound?

2. When ¼ bushel of potatoes is worth 20¢, what should I pay for ½ bushel?

3. When ½ acre yields 10 bushels of wheat, what should ¼ acre yield?

4. When ¼ barrel of flour weighs 49 pounds, what will ½ barrel weigh?

5. When 5 things cost $8, what should 10 of the same kind cost? What should 15 cost? What should 20 cost?

6. When I can buy 6 large marbles for 25¢, what shall I have to pay for 12? For 24?

7. A farmer had 18 calves. He sold 6 for $90. At this rate what should he receive for the other 12?

8. 3 collars for 25¢ makes 6 cost what? 9 will cost what? What is the price per dozen?

9. 32¢ per peck is how much per bushel? How much per quart?

10. I have 5 acres of beans in one field and 15 in another. If I gather 98 bushels from the small field, what shall I expect from the larger?

11. If I get 285 bushels from the 15-acre field, what shall I expect to get from the 5-acre field?

12. When 4 cords of wood cost $23.40, what shall I have to pay for 24 cords?

1. Write six hundreds, four tens, and seven ones.

2. Write 9 hundreds and 8 ones.

3. Write 7 hundreds and 3 tens.

4. Tell what each figure represents in these numbers: 906, 784, 390, 248, 109, 901.

In a whole number,
the fourth place from the right stands for **thousands,**
the fifth place for **ten-thousands,**
the sixth for **hundred-thousands.**
2,000 = 2 *thousands* or *two-thousand.*
20,000 = 2 *ten-thousands* or *twenty-thousand.*

We separate large numbers into groups of threes by commas. This makes the reading easier.

We call the first group **ones' group** and the second group **thousands' group.**

5. In 45,260, what number in thousands' group? What one in ones' group?

6. 45,260 is read *forty-five thousand, two hundred sixty.* Do not use *and* in reading whole numbers.

7. Read the population in 1900 of the following cities : —

Cambridge, Mass.	91,886.	Grand Rapids, Mich.	87,565.
Portland, Maine	50,145.	Vicksburg, Miss.	14,834.
Topeka, Kan.	33,608.	Lincoln, Neb.	40,169.
Des Moines, Ia.	62,139.	Atlanta, Ga.	89,872.
Peoria, Ill.	56,100.	Lexington, Ky.	26,369.
Hartford, Conn.	79,850.	Austin, Tex.	22,258.

Write the following in figures : —

1. Thirty-five thousand three hundred forty seven.
2. Ninety-six thousand two hundred thirteen.
3. Eighty thousand two hundred four.
4. Sixty-nine thousand forty-seven.
5. Ninety thousand nine hundred nine.
6. Twenty-six thousand two hundred.
7. Nineteen thousand nineteen.
8. Seventy thousand seventy.
9. Eighty-four thousand six hundred three.
10. Eighty-seven thousand four.

Read the following, then write from dictation : —

11.	12.	13.	14.
87,654	12,347	70,639	90,147
75,543	24,738	12,074	12,903
60,432	10,728	82,937	27,036
54,301	13,506	93,002	80,763
43,209	27,364	37,829	76,052
19,876	28,053	92,083	20,378

Add and read the results : —

15.	16.	17.	18.	19.
2738	1293	4728	9563	9237
837	9827	7286	8573	5428
9283	576	428	1754	2647
7836	764	1397	5698	1234
9372	2837	9864	6915	9283

1. How many cents in a dime? In 3 dimes? In 5?

2. How many dimes in 20¢? In 30¢? In 50¢?
In 80¢?

3. At 10¢ a gallon, 7 gallons of oil will cost ——.

4. For 90¢ I could buy —— collars at 10¢ each. $\frac{1}{10}$ of
90 is ——.

5. $\frac{1}{10}$ of 80 + $\frac{1}{7}$ of 49 = ——.   8 × 8 from 7 × 10 = ——.

6. In 1 dime there are —— cents; in 10 dimes there
are 10 × —— cents, or —— cents.

100 cents = 1 dollar, written $1.00

7. A dime is —— of a dollar. $\frac{3}{10}$ of a dollar = —— cents.
$\frac{5}{10}$ of $1 = —— cents. $\frac{1}{2}$ = —— cents.

8. Mary bought 6 yards of cloth at 8¢ a yard. How
much change should she receive if she gave the store-
keeper 5 dimes?

9. In 38 what does the 3 stand for? The 8?

10. How would you write 3 tens and no ones?

11. Three 10's = what?   4 tens or 4 × 10 = ——.

12. 5 × 10 = ——.   6 × 10 = ——.   7 × 10 = ——.   8 10's?

13. 1 hundred = —— tens. 10 tens = ——.   10 × 10 = ——.

14. How many *ones* in 7 *tens?*   In 7 *tens* + 8 *ones?*

15. 2 hundreds = —— tens. 10 *tens* + 5 *tens* + 6 *ones* = ——.

16. How many tens and ones in 64, 18, 48, 73, 92, 87.

17. Make 10 rows of squares of 10 squares each. Fill
these 100 squares with the multiples you have learned.
(See p. 44.)

Give quotients either by lines or columns : —

	A	B	C	D	E	F	G
1.	6)42	2)8	6)18	10)90	6)60	10)30	8)56
2.	3)27	2)2	6)24	8)40	9)9	9)27	2)20
3.	4)36	4)16	4)20	2)18	7)14	8)16	3)6
4.	6)12	5)15	7)42	9)72	9)18	5)20	3)24
5.	7)56	7)28	3)3	5)35	8)8	7)7	8)80
6.	6)54	7)35	5)10	10)80	4)28	4)12	5)25
7.	10)100	2)16	8)64	5)45	6)30	2)6	2)10
8.	3)30	3)21	10)50	4)24	3)18	5)40	9)54
9.	8)48	6)54	9)81	3)12	4)8	7)49	5)50
10.	6)48	10)60	2)4	7)70	2)14	3)15	10)10
11.	9)63	4)32	6)36	7)21	10)40	10)70	4)40

To THE TEACHER. — The numbers below will afford practice in dividing where there is a remainder. Any of the first 3 lines, or the first 3 numbers in any column, are to be divided by 3, any of the first 4 lines, or 4 numbers in any column by 4, and so on.

	A	B	C	D	E	F	G	H	I	J
1.	1	7	5	8	2	9	6	3	10	4
2.	16	13	20	12	15	19	11	18	14	17
3.	24	30	25	21	27	28	26	22	29	23
4.	34	39	32	40	35	31	38	36	33	37
5.	45	41	50	46	42	49	47	43	48	44
6.	51	56	52	57	53	58	54	59	55	60
7.	65	70	64	69	63	68	62	67	61	66
8.	74	79	75	80	76	71	78	72	77	73
9.	85	90	84	89	83	88	81	86	82	87
10.	96	91	97	95	92	98	93	99	94	100

a. Without filling the — give products by lines or columns.

b. Fill the — with 1, 2, 3, 4, 5, 6, 7, 8, or 9, as the teacher may direct, and give the results by lines or by columns.

	A	B	C	D
1.	2 × 2 + —	3 × 6 + —	7 × 9 + —	10 × 10 + —
2.	4 × 7 + —	3 × 4 + —	10 × 1 + —	6 × 9 + —
3.	7 × 8 + —	2 × 8 + —	9 × 4 + —	9 × 7 + —
4.	6 × 1 + —	3 × 3 + —	8 × 8 + —	5 × 8 + —
5.	4 × 10 + —	7 × 5 + —	2 × 6 + —	4 × 3 + —
6.	10 × 2 + —	5 × 9 + —	3 × 9 + —	3 × 8 + —
7.	6 × 8 + —	9 × 3 + —	7 × 7 + —	10 × 7 + —
8.	8 × 5 + —	5 × 6 + —	2 × 3 + —	3 × 5 + —
9.	3 × 7 + —	6 × 4 + —	7 × 7 + —	9 × 1 + —
10.	10 × 5 + —	7 × 3 + —	8 × 7 + —	5 × 5 + —
11.	9 × 6 + —	4 × 5 + —	4 × 2 + —	4 × 1 + —
12.	5 × 4 + —	9 × 2 + —	7 × 6 + —	8 × 3 + —
13.	8 × 6 + —	2 × 1 + —	10 × 8 + —	10 × 9 + —
14.	2 × 10 + —	4 × 9 + —	8 × 1 + —	9 × 8 + —
15.	7 × 10 + —	9 × 9 + —	5 × 10 + —	6 × 10 + —
16.	6 × 3 + —	6 × 7 + —	3 × 2 + —	4 × 8 + —
17.	9 × 9 + —	10 × 4 + —	3 × 1 + —	6 × 6 + —
18.	2 × 5 + —	6 × 5 + —	2 × 9 + —	2 × 7 + —
19.	5 × 2 + —	5 × 1 + —	10 × 3 + —	8 × 9 + —
20.	7 × 6 + —	9 × 10 + —	7 × 2 + —	3 × 10 + —
21.	10 × 6 + —	9 × 7 + —	9 × 5 + —	4 × 4 + —
22.	6 × 2 + —	7 × 4 + —	7 × 8 + —	5 × 7 + —

1. When one book costs $1.38, 7 books will cost $7 \times \$1.38$, or ——.

$1.38 = $ Multiplicand.
     $7 = $ Multiplier.
$\overline{\$9.66} = $ Product.

Remember that when there are cents in the multiplicand, the last two right-hand figures in the product will be cents, and must be separated from the dollars by a period.

Find the cost of

2. 8 books at $1.24 each.

3. 9 chairs at $2.17 each.

4. 6 rings at $3.46 each.

5. 5 fans at $2.39 each.

6. 7 knives at $1.49 each.

7. 4 chairs at $3.47 each.

8. 6 vases at $2.96 each.

9. 5 hats at $3.67 each.

10. 9 pins at $2.19 each.

11. 10 pictures at $4.73 each.

12. When I divide $7.50 among 4 boys, each one will receive $\frac{1}{4}$ of $7.50, or ——.

Divisor $= 4) \underline{\$7.50} = $ Dividend.
       $1.87 = $ Quotient.
      $0.02 = $ Remainder.

Remember that the right-hand figures are cents when the dividend contains cents. Separate them from the dollars by a period.

Proof: $4 \times \$1.87 + \$0.02 = \$7.50.$

Find the cost of one when

13. 8 lamps cost $17.28.

14. 9 clocks cost $24.21.

15. 7 desks cost $86.66.

16. 6 spoons cost $11.34.

17. How many bushels in 397 pecks?

18. How many gallons in 796 pints?

19. How many pecks in 98 bushels?

20. How many pints in 246 gallons?

1. A man paid $17.50 for a harness and 5 times as much for a carriage. What did both cost?

2. A woman sold 8 dozen eggs for $1.84. What was that a dozen? What should she have received for 7 dozen?

3. I paid $18.60 each for 9 young calves and sold them all for $196. How much did I gain?

4. A dealer paid $65.50 for 8 rockers and retailed them at $9.75 each. What did he gain?

5. A boy earned $51.75 in 9 weeks. What was that per week? How much did he earn in 2 weeks? How much in 7 weeks?

6. I bought a watch for $42 and sold it so as to make $\frac{1}{6}$ the cost. What did I get for it?

7. When 9 sheep are worth $72, what are 18 worth? What are 45 worth? (Do not find the cost of one.)

8. How many quarts in 9 bushels?

9 How many bushels in 392 pecks?

10. How many gallons in 976 quarts?

11. How many pecks in 984 quarts?

12. When coal is $6 per ton, how much can I buy for $78?

13. If a barrel hold $2\frac{1}{2}$ bushels, how many bushels will 40 barrels hold?

14. A merchant spent $336 for suits at $7 each. How many did he buy?

15. How many weeks in 225 days?

(*a*) Multiply each number by 2; 3; 4; 5; 6; 7; 8; 9.

(*b*) Divide each by 2; 3; 4; 5; 6; 7; 8; 9.

	A	*B*	*C*	*D*	*E*
1.	$3.74	$15.63	$68.40	$126.73	$964.25
2.	$4.56	$17.75	$59.17	$137.86	$832.92
3.	$5.78	$16.64	$48.52	$156.45	$761.86
4.	$6.90	$19.79	$97.33	$246.75	$864.47
5.	$7.12	$14.85	$65.24	$258.50	$635.94

(*c*) *Add each column beginning at the bottom, and check by adding down.*

	F	*G*	*H*	*I*	*J*
6.	197	765	487	793	769
7.	928	739	529	581	876
8.	873	894	468	629	245
9.	417	984	757	924	347
10.	652	859	836	786	705

(*d*) Add and check each row.

Find the difference between : —

11. 1756 and 4553.

12. 16924 and 86693.

13. 2349 and 4682.

14. 2025 and 8141.

15. 15321 and 7659.

16. 8347 and 9238.

17. 6705 and 9477.

18. 6841 and 4038.

19. 7238 and 5467.

20. 3094 and 6243.

The coins commonly used in business are of the value of
1¢, 5¢, 10¢, 25¢, 50¢, and $1.

Besides coins, banknotes are also used; they are worth
$1, $2, $5, $10, $20, and sometimes more.

1. John buys 17 cents' worth of paper, and gives the
dealer a 25-cent piece. He will receive in change ——
cents.

The dealer may count the change as he gives it to John. Begin-
ning with the cost of the paper, he will say, — 17 and 3 are 20, and
5 are 25, or simply 17, 20, 25, — as he gives him 3 cents and a nickel.

2. Clara buys 38 cents' worth of thread and needles,
and gives the clerk a half-dollar. She will receive ——
cents in change.

The clerk says, — 38 and 2 are 40, and 10 are 50, or 38, 40, 50, —
as he gives her 2 cents and a dime.

3. Make change out of a quarter for a 13-cent sale.

4. Count change for a 68-cent sale out of a dollar.

5. If you were a clerk, how would you count change
for 51 cents if the buyer gave you $1?

6. Mr. Ward sells 7 qt. of milk at 8 cents and receives
3 silver quarters. Count the change for him.

Make change for

7. $1.25 out of $5.   10. $3 out of $10.

8. 73¢ out of $2.   11. $1.56 out of $2.

9. 29¢ out of $½.   12. 6 yd. at 11¢ out of $1.

1. Ten 4's or $10 \times 4 = 40$, or 4 tens. $10 \times 8 = $ ——, or —— tens.

A zero at the right of 4 changes the *ones* to *tens*, or multiplies the number by 10.

2. 10×14.   **4.** 10×17.   **6.** 10×21.   **8.** 10×39.

3. 10×15.   **5.** 10×19.   **7.** 10×23.   **9.** 10×48.

10. $20 \times 4 = 10 \times 2 \times 4$, or ——. $18 = $ Multiplicand.

11. $20 \times 6 = 10 \times 2 \times 6$, or ——. $30 = $ Multiplier.

12. $30 \times 18 = 10 \times 3 \times 18$, or ——. $\overline{540} = $ Product.

13. 20×16.   **15.** 30×21.   **17.** 40×52.   **19.** 50×37.

14. 20×18.   **16.** 30×23.   **18.** 40×63.   **20.** 50×73.

21. Multiply 32 by 24.

$$32 = \text{Multiplicand.}$$
$$24 = \text{Multiplier.}$$
$$4 \times 32 = \overline{128} = \text{First Partial Product.}$$
$$20 \times 32 = 640 = \text{Second Partial Product.}$$
$$\overline{24} \times 32 = \overline{768} = \text{Complete Product.}$$

In practice we omit the zero in the second partial product.

22. Find 26 times 38.   **23.** Find 34 times 43.

Multiply	*How many are*	*Find product of*
24. 34 by 23.	**30.** 93×47.	**36.** 123 and 67.
25. 47 by 45.	**31.** 87×69.	**37.** 138 and 89.
26. 58 by 67.	**32.** 64×58.	**38.** 245 and 95.
27. 63 by 78.	**33.** 85×36.	**39.** 783 and 47.
28. 75 by 83.	**34.** 98×76.	**40.** 298 and 64.
29. 82 by 93.	**35.** 85×35.	**41.** 357 and 93

1. When a man earns $75 in a month, what does he earn in a year?

2. My house rent is $32 a month. What do I pay in 2 years or 24 months?

3. A farmer sold 84 young cattle at $26 each. What did he get for them?

4. If each acre produces 28 bushels of wheat, what does a farmer get from 48 acres?

5. A dealer bought 18 sofas at $13.50 each. What did they cost him? What did he make on the lot if he sold them at $21.50 each?

6. A man bought a fruit farm of 26 acres at $245 an acre. What did it cost him?

7. In an orchard a man has 26 rows of apple trees. If he gathers 98 bushels from one row, what may he expect from the whole orchard?

8. How many square feet in the ceiling of your school-room if it is 28 feet wide and 32 feet long?

9. My yard is 48 feet wide and 65 feet long. How many square feet does it contain?

10. Compute the number of square feet in a lawn 72 feet wide and 96 feet long.

11. I paid $4788 for a house and spent $\frac{1}{4}$ of this amount in repairs. What was the total cost of the property?

12. Of a flock of 896 sheep, $\frac{1}{8}$ of them are black. How many white ones?

TABLE

60 seconds (sec.)   = 1 minute (min.)
60 minutes   = 1 hour (hr.)
24 hours   = 1 day (da.)
 7 days   = 1 week (wk.)
30 (31, 28, 29) days = 1 month (mo.)
12 months   = 1 year (yr.)
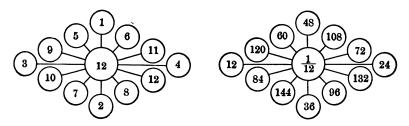
1. How far does the long hand of a clock move in 1 hour?

2. A half hour is how many minutes? How many minutes in $\frac{1}{4}$ of an hour?

3. Where are the hands of a clock at a quarter past one o'clock?

4. Where are they at half past four o'clock?

5. Where are the hands at quarter to nine?

6. Recess lasts 15 min. What part of an hour is that?

7. If you have an hour and a half at noon, how many minutes is that?

8. $\frac{1}{2}$ hr. = —— min. ; $\frac{1}{4}$ hr. = —— min. ; $\frac{1}{3}$ hr. = ——.

9. If you sleep 8 hours every day, what part of the time do you sleep? 8 is —— of 24.

10. $\frac{1}{3}$ of a year is —— months. $\frac{2}{3}$ of a year are 2 × —— months, or —— months.

11. 3 months is —— of a year. $\frac{1}{4}$ of 12 = ——.

1. $11 + 11 = 2 \times 11$, or ——.   11 in $22 =$ ——. $\frac{1}{11}$ of 22 is ——.

2. $33 =$ —— $\times 11$. $\frac{1}{3}$ of 33 is ——. $\frac{1}{11}$ of 33 is ——.

3. 44 apples are —— $\times 11$ apples. $11)44 =$ ——.

4. $5 \times 11 = 55$. $7 \times$ —— $= 77$. $9 \times 11 = 99$. $11 \times 11 = 121$. $6 \times 11 =$ ——. $8 \times 11 =$ ——. $10 \times 11 = 110$. $12 \times 11 = 132$.

5. Count by 11's from 0 to 132 and back.

6. $7 \times 11 =$ ——. $\frac{1}{11}$ of 88 is ——.   Nine 11's are ——. $11)55$.

7. $6 \times 11 =$ ——.   8. $3 \times 11 =$ ——.   9. $12 \times 11 =$ ——.
$8 \times 11 =$ ——. $9 \times 11 =$ ——. $7 \times 11 =$ ——.
$10 \times 11 =$ ——. $4 \times 11 =$ ——. $11 \times 11 =$ ——.

10. $11)\overline{22}$ 11. $11)\overline{33}$ 12. $11)\overline{132}$
$11)\overline{66}$ $11)\overline{77}$ $11)\overline{88}$
$11)\overline{99}$ $11)\overline{132}$ $11)\overline{121}$

13. When 1 gallon of oil costs 11¢, 5 gallons will cost —— $\times$ ——, or —— cents.

14. When I pay 77¢ for 7 dozen of eggs, one dozen costs me $\frac{1}{7}$ of 77¢, or —— ¢.

15. If I should pay for 11 pounds of cheese at 9¢ a pound with a silver dollar, I should have —— ¢ left.

16. 11 pecks = —— quarts.   11 gallons = —— quarts.

17. In 77 days there are —— weeks.   7 in 77 = ——.

18. In a year there are 12 months.   A boy 11 years old has lived —— $\times$ —— months, or —— months.

1. $12 + 12 =$ ———. $2 \times 12 =$ ———.

   12 things = 1 dozen (doz.)

2. 3 dozen oranges are how many ? $3 \times 12 =$ ———.

3. $12 + 12 + 12 + 12 =$ ———. $4 \times 12 =$ ———.

4. Make a table of 12's from 2×12 to 10×12.

5. In 3 feet how many inches ?

6. How many inches in 5 feet ?

7. In 72 inches how many feet ? $\frac{1}{12}$ of $72 =$ ———.

8. 108 inches make ——— feet, for $\frac{1}{12}$ of 108 is ———.

9. 96 inches = ——— feet.   84 inches = ——— feet.

10. Give products at sight.   11. Give quotients at sight.

12. A foot is 12 inches long; 3 ft. contain ——— inches.

13. 7 ft. = ——— in.;   9 ft. = ——— in.;   4 ft. = ——— in.

14. There are 12 months (mo.) in a year (yr.); a girl 9 years old has lived ——— × ——— mo., or ——— mo.

15. In 2 weeks there are ——— × 7 days, or ——— days.

16. $\frac{1}{12}$ of $72 + \frac{1}{12}$ of $120 =$ ———. $132 =$ ——— 12's.

17. How many dozen in 108 ?   In 36 ?   In 144 ?   In 96 ?   In 84 ?   In 72 ?

1. Find the sum of seventeen dollars and eighty-four cents, and ninety-three dollars and sixty-nine cents.

2. What remains when 2×36 is taken from 17×36?

3. What shall I pay for 18 tons of coal, when one ton costs $5.75?

4. Frank Curtis has $12.42; he spends $\frac{1}{9}$ of it for books. How much *remains?*

5. How many days in a year? There are in

January, 31	May, 31	September, 30
February, 28	June, 30	October, 31
March, 31	July, 31	November, 30
April, 30	August, 31	December, 31

6. Every fourth year is a *leap* year, and then February has 29 days, and the year has —— days.

7. Max is 9 years old; two of the years were leap years. Can you tell how many days he has lived?

8. What will 627 2-cent stamps and 500 postal cards cost?

9. How many minutes in $12\frac{1}{2}$ hours?

10. Fill the first blank with 2, 3, 4, 6, 8, 9, or 12, and solve the seven examples that you will then have.

When —— books cost $17.28, 1 book will cost —— of $17.28, or ——; 29 books will cost —— × —— or ——.

11. Make a multiplication table from $1 \times 24 = 24$ to $12 \times 24 = 288$.
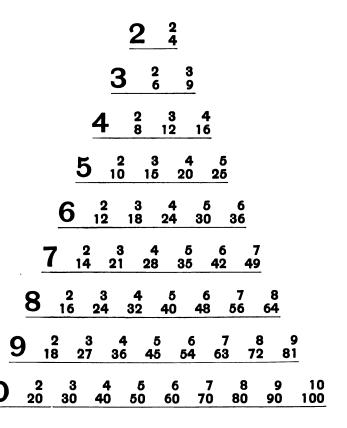
1. A steamer has on board 296 oxen, 649 sheep, 214 horses, and 492 swine. How many animals on board?

2. Out of an oil tank containing 4361 gallons, 794 gallons are taken. How many gallons remain?

3. A nurseryman sets out 34 rows of plants with 49 in a row. How many plants does he set out?

4. How many inches long is a piece of ribbon that measures 8 yards? There are 36 inches in a yard.

5. In a year there are 365 days. How much more than 52 weeks is this?

6. Edward Howes paid $1.87 for his sled, and sold it for $2.41. What did he gain?

7. If you earn 3 cents a day, how much can you earn in 8 weeks?

8. A fisherman caught 968 fish; $\frac{1}{8}$ were haddock and the rest were cod. How many were cod?

9. Henry earns 67 cents a day picking cranberries. How much can he earn in 3 weeks?

10. At 20 cents a can what will 18 cans of soup cost?

11. A merchant receives $3.47, $1.29, $6.82, and $5.95, and then pays out $4.26. What has he left?

12. A quire of paper contains 24 sheets. How many sheets in 17 quires?

13. What is left of $5.00 after paying for $6\frac{1}{2}$ lb. of tea at 50 cents a pound?

1. If a barrel of sugar weighs 243 pounds and costs the grocer $10.85, what does he make by selling it at 6¢ per pound?

2. A farmer raised 290 bushels of buckwheat, 785 bushels of wheat, 596 bushels of corn, and 689 bushels of oats. How many bushels of grain did he raise?

3. I bought a house and lot for $3986. When I sold it, I lost $198. What did I get for it?

4. If $6 will pay for one sheep, how many can I buy for $420?

5. When 30 sheep cost $165, what will I have to pay for 60? (Use a short method.)

6. A woman took to a store

 13 dozen eggs worth 19¢ a dozen,

 $14\frac{1}{2}$ pounds of butter worth 24¢ a pound, and

 23 pounds of dressed fowl worth 14¢ per pound;

and bought at the store

 5 pounds of coffee at 38¢ a pound,

 6 pounds of rice at $8\frac{1}{3}$¢ a pound, and

 25 pounds of sugar at 6¢ a pound;

how much money should she receive?

7. How many calves worth $18 each will pay for 96 sheep worth $6 each? (How many sheep will the price of 1 calf buy?)

8. How many dozen eggs worth 21 cents a dozen will pay for 126 pounds of sugar worth 7¢ a pound?

9. Find the cost of 38 feet of rubber hose at 2¢ an inch.

1. Remembering that $6 \times 9 = 9 \times 6$, $7 \times 8 = 8 \times 7$, $3 \times 9 = 9 \times 3$, etc., find in the following tables 9×7; 3×8; 9×4; 9×9.

2. Find in the same table $64 \div 8$; $72 \div 8$; $45 \div 9$.

3. Explain how to use the table as a division or multiplication table.

2	2
	4

3	2	3
	6	9

4	2	3	4
	8	12	16

5	2	3	4	5
	10	15	20	25

6	2	3	4	5	6
	12	18	24	30	36

7	2	3	4	5	6	7
	14	21	28	35	42	49

8	2	3	4	5	6	7	8
	16	24	32	40	48	56	64

9	2	3	4	5	6	7	8	9
	18	27	36	45	54	63	72	81

10	2	3	4	5	6	7	8	9	10
	20	30	40	50	60	70	80	90	100

10 cents (¢)	= 1 dime (d.)
10 dimes	= 1 dollar ($)
4 gills (gi.)	= 1 pint (pt.)
2 pints	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)
2 pints	= 1 quart
8 quarts	= 1 peck (pk.)
4 pecks	= 1 bushel (bu.)
16 ounces (oz.)	= 1 pound (lb.)
2000 pounds	= 1 ton (T.)
12 inches (in.)	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
$5\frac{1}{2}$ yards	= 1 rod (rd.)
320 rods	= 1 mile (mi.)
60 seconds (sec.)	= 1 minute (min.)
60 minutes	= 1 hour (hr.)
24 hours	= 1 day (da.)
7 days	= 1 week (wk.)
12 months (mo.)	= 1 year (yr.)
12 things	= 1 dozen (doz.)
20 things	= 1 score.
24 sheets	= 1 quire.
20 quires	= 1 ream.

THE
SOUTHWORTH-STONE ARITHMETIC

FIRST BOOK

PART II

NOTATION AND NUMERATION

1. Tell what each figure represents in these numbers:—

3268,   2097,   1004,   7070,   9607.

2. *Write:* Four thousand, six hundred seven; nine thousand eighty.

3. Twenty-seven thousand four hundred six.

In a whole number the *fifth* figure from the right, or the fifth *order,* stands for **ten-thousands,** and the *sixth* for **hundred-thousands.** Thus: 20,000 = 2 *ten-thousands,* or 20 *thousand;* 200,000 = 2 *hundred-thousands,* or 200 *thousand.*

The three right-hand figures make the *ones' group,* and the other figures make the *thousands' group.* If we separate these groups by a comma, it will make the reading easier. Do not use *and* in reading a whole number.

Read the population in 1900 *of the following cities :* —

New Haven,	108,027	Boston,	560,892
Indianapolis,	169,164	Minneapolis,	202,718
Louisville,	204,731	Jersey City,	206,433

Reading numbers written in figures is **Numeration.**

In a whole number, the 7th, 8th, and 9th figures make the **millions'** group, containing **millions, ten-millions,** and **hundred-millions.** Thus : —

1,000,000 = 1 *million;* 20,000,000 = 20 *millions;*
132,460,910 = 132 *millions,* 460 thousands, 910 (ones).

The names of the first three groups or **periods,** and the names of the units in each order, are shown in the following table : —

NAMES OF GROUPS	MILLIONS			THOUSANDS			ONES		
NAMES OF UNITS	*Hundred-millions*	*Ten-millions*	*Millions*	*Hundred-thousands*	*Ten-thousands*	*Thousands*	*Hundred ones*	*Ten ones*	*Ones*
FIGURES . . .	1	3	9	6	2	4	8	5	7

The number in the table is one hundred thirty-nine *million,* six hundred twenty-four *thousand,* eight hundred fifty-seven (ones).

We do not use the group name, *ones,* in reading a number.

Read the population in 1900 *of the following* : —

Illinois,	4,821,550	New York,	7,268,894
Texas,	3,048,710	Philippine Is.,	6,961,339
Wisconsin,	2,069,042	Pennsylvania,	6,302,115
Missouri,	3,106,665	United States,	76,212,168

Write in figures : —

1. Three million, two hundred four thousand, sixty-nine.

2. Seventy million, three hundred forty-six thousand, three hundred ninety-eight.

3. 26 million 37 thousand 68.

4. 103 million 98 thousand 300.

5. 9 million 9 thousand 9.

Writing numbers in figures is **Notation.**

6. Fill the blanks in the following : —

10 ones = 1 ten   10 thousands = —— ten-thousand

10 —— = 1 hundred   10 —— = 1 hundred-thousand

—— hundreds = 1 —— 10 —— = 1 million

Principle. Ten *units of any order make* **one** *unit of the next left-hand order.*

This is the reason why our system of numbers is called a **decimal system.** *Decimal* comes from a word meaning *ten.*

7. Compare the value of the 5's in 55.

8. What does the zero show in 303? Compare the values of the 3's.

9. How can you give to 7 a value ten times as great ?

10. Compare 7, 70, and 700.

11. Tell what each 4 represents in $ 444.

1. What *seven* letters are sometimes used to stand for numbers?

2. When do we use such a method of writing numbers?

3. *Give the value of each of the following :* —

I   V   X   L   C   D   M

These letters are called the **Roman numerals.**

4. *Give the value of :* —

I	VI $(5+1)$	XI $(10+1)$	LX $(50+10)$
II	VII	XX	LXX
III	VIII	XXX	LXXX
IV $(5-1)$	IX $(10-1)$	XL $(50-10)$	XC $(100-10)$
V	X	L	C

5. *Other numbers are written thus :* —

$$20 + 3 = XX + III = XXIII = 23$$
$$40 + 5 = XL + V = XLV = 45$$
$$50 + 6 = L + VI = LVI = 56$$
$$60 + 7 = LX + VII = LXVII = 67$$
$$80 + 9 = LXXX + IX = LXXXIX = 89$$
$$100 + 6 = C + VI = CVI = 106$$

6. *Read the following numbers of chapters in a book :* —

XIV	XXVII	XXXV	XLVIII	LXXXVI
XVI	XXIX	XXXVI	LXXI	XCVIII

7. *Learn the following :* —

C $= 100$; CX $= 110$	D $= 500$; DXIV $= 514$
CC $= 200$; CCL $= 250$	DC $= 600$; DCLX $= 660$
CCC $= 300$; CCCV $= 305$	M $= 1000$; MM $= 2000$
CD $= 400$; CDXX $= 420$	MD $= 1500$; MCMV $= 1905$

Combining several numbers into one sum is ———. Each
of the numbers is called an **addend**.
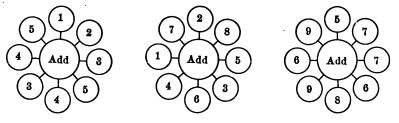
1. *Give the sum of each column and row in each square:* —

2 8 3	3 9 6	4 1 7	5 2 8	6 3 9	7 4 1	5 7 8	6 9 7
4 7 8	5 3 9	6 4 5	3 2 8	3 7 6	5 9 4	3 8 2	1 7 6
8 4 9	6 7 3	8 9 5	4 6 7	3 9 7	8 6 5	4 2 9	3 7 8

2. *Give the sum of each column and row:* —

6 3 9 7	5 4 9 5	8 2 6 4	3 9 6 5	7 1 4 9	2 8 3 6
3 4 8 7	3 6 7 4	9 8 3 2	4 5 9 8	4 3 7 6	8 9 9 8
7 7 6 7	4 8 8 9	8 9 7 6	4 9 3 1	4 8 9 7	7 6 6 4
2 4 5 9	8 5 4 7	2 3 6 4	5 5 8 7	6 9 3 8	6 4 9 1
8 9 7 5	4 8 4 3	3 6 2 3	7 9 8 4	2 6 5 4	3 7 3 8

3. Begin at any number, and add in either direction till
you reach 100.

4. To each of the numbers below add 2; 3; 4; 5; 6;
7; 8; 9.

22	56	87	42	84	72	39	23	85	67	69	79	25
94	62	47	24	55	32	63	89	34	78	49	96	52
38	33	93	82	74	64	45	75	57	29	95	66	97

1. How many quarts of strawberries did a gardener gather ·in one week as follows: Monday 368 quarts, Tuesday 418 quarts, Wednesday 397 quarts, Thursday 308 quarts, Friday 417 quarts, and Saturday 298 quarts?

2. A boy earns the following sums in a week: 68 cents, 72 cents, 96 cents, 78 cents, 86 cents, 94 cents. What were his earnings for the week?

3. In one week a milkman delivered as follows: Monday 318 quarts, Tuesday 512 quarts, Wednesday 489 quarts, Thursday 476 quarts, Friday 488 quarts, Saturday 515 quarts, Sunday 473 quarts. How many quarts were delivered during the week?

4. A farmer raised 386 bushels of potatoes last year, and 196 bushels more this year than last. How many bushels did he raise in the two years?

5. A merchant's bank deposits for the week were as follows: $876; $798; $918; $1073; $892; $1196. What were the total deposits for the week?

6. In seven days a boy delivered papers as follows: 133, 98, 101, 96, 89, 93, and 117. What was the total number delivered?

7. A farmer has 216 sheep in one pasture, 97 more in a second pasture than in the first, and as many in a third as in both the other two. How many has he in all?

8. A man bought a lot for $875. He built a house on it costing $3250 and a barn costing $980. What did his whole property cost?

1. Count by 7's from 1 to 99.   From 3 to 108.

2. Count by 20's from 5 to 305.

3. $40 + 30 + 90 = ?$ 5. $50 + 60 + 90 + 80 + 100 = ?$

4. $\$7.50 + \$2.25 = ?$ 6. $\$0.75 + \$0.25 + \$2.35 = ?$

7. $2\frac{1}{2}$ ft. added to $3\frac{1}{2}$ ft. are what?

8. I paid $\$0.18$ for nails, $\$0.38$ for a hammer, and $\$0.12$ for screws.   Count the change back from a dollar.

9. What is the weight of a mixture of 18 lb. of almonds, 22 lb. of walnuts, 5 lb. of pecans, and 7 lb. of filberts?

10. What is the distance around a slate 12 inches long and 10 inches wide?

11. A post in the middle of a field is 13 rods from the fence.   How wide is the field?

12. How many feet of fence will be needed to surround a lot 100 feet long and 50 feet wide?

What did I pay in all for the following articles?

13. Mustard,   12¢
    Cloves,   9¢
    Mace,   10¢

14. Raisins, $\$0.17$
    Prunes,   0.18
    Currants, 0.12

15. Broom, $\$0.30$
    Brush,   0.50
    Dustpan, 0.25

16. Scissors, $\$0.25$
    Basket,   0.50
    Needles,   0.10
    Thimble,   0.25

17. Paper,   17¢
    Envelopes, 12¢
    Penholder,   5¢

18. Shoes, $\$2.00$
    Gloves,   0.75
    Hat,   1.25

Below are a dealer's sales for a week. Find his sales for each day, and also the value of each kind of merchandise sold.

		1.	2.	3.	4.	5.	6.
		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
7.	Coal,	$37.94	$246.93	$89.75	$841.96	$63.29	$63.92
8.	Wood,	39.75	81.92	91.32	372.94	87.58	74.85
9.	Cement,	24.62	101.75	3.75	86.91	14.62	59.81
10.	Lime,	19.83	93.65	69.48	18.42	93.87	6.43
11.	Hair,	17.69	29.32	27.85	9.75	49.24	2.84

12. My parlor is 18 ft. long and 14 ft. wide. My sitting room is 15 ft. long and $12\frac{1}{2}$ ft. wide. How much picture molding shall I need, allowing 4 ft. for waste?

13. Add all the numbers between 3748 and 3800 that end in 9.

14. James has $2.17, Edward has $1.25 more than James, and Charles has $2.74 more than Edward. How much money have the three boys?

15. What is the distance around your schoolroom if it is 32 ft. long and 28 ft. wide?

16.	17.	18.	19.	20.
11398 +	13189 +	14298 +	12860 +	15967 +
3269	2383	3741	4164	1812
4058	5238	3195	2252	3316
6952	6338	8368	9147	7888
10942	4577	4613	3522	5283

1. Count backward by 6's from 98 to 2.
2. Count by 7's from 105 to 7.
3. $23 - 8 =$ —— for —— $+ 8 = 23$.
4. Count backward by 8's from 98 to 2.

Subtract each of the following numbers from 100, *giving the remainders only* : —

	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
17.	11	88	44	74	52	70	36	13	60	75	37	48
18.	35	61	82	14	91	33	22	65	42	53	15	59
19.	83	30	23	57	89	43	95	29	90	32	84	26
20.	20	81	73	63	21	94	56	99	17	93	41	66
21.	36	19	62	45	96	18	50	46	76	40	71	62

22. Take 300 from 1000; 600 from 1100; 700 from 1200.

23. Take 250 from 500; from 750; from 1000.

24. From $5.00 take $1.25; take $2.50.

25. *Give the differences as rapidly as possible at sight* : —

67	59	75	86	94	47	85	53	78	59	135	265	31
30	40	60	50	71	32	53	23	36	48	80	95	7

26.	539	827	396	417	824	391	864	249	618	347
	408	325	190	95	704	270	453	127	93	86

27.	1246	3721	4986	5478	3966	2791	4865	7983
	300	600	880	5406	3900	2500	4105	6981

1. Take 372 out of 700.

WORK

$$700 = 600 + 90 + 10$$
$$372 = 300 + 70 + 2$$
$$\overline{328 = 300 + 20 + 8}$$

EXPLANATION.—As there are no ones and no tens in the minuend, we change 1 of the 7 hundreds to 10 tens; we then change 1 of these 10 tens to 10 ones. The minuend then becomes

from which we take . . .

and we have as the remainder

6 *hundreds* 9 *tens* 10 *ones*
3 *hundreds* 7 *tens* 2 *ones*
3 *hundreds* 2 *tens* 8 *ones*, or 328.

In practice we may simply say 2 from 10, 8 ; 7 from 9, 2 ; 3 from 6, 3. Remainder 328.

2. 610	**3.** 500	**4.** 8120	**5.** 9000	**6.** 8000
− 425	− 137	− 3769	− 137	− 1643

7. I owe a grocer $80.00. If I begin Monday and pay him $ 3.78 every day during the week, how much shall I owe him Saturday evening ?

8. How much shall I add to $ 47.83 to make it $ 78.34 ?

9. Subtract from 100 by 7's until your remainder is 51. What is the sum of your remainders ?

10. I have bought 12,846 lb. of coal. It comes in 3 loads. The first weighs 4785 lb., and the second 5640 lb. What ought the third to weigh ?

11. It requires 375,000 bricks for a house ; 182,575 have been received ; how many more must be bought ?

12. A doctor owes a grocer $287.83, and the grocer owes the doctor $175.28. The doctor pays $28.36. How much does he still owe ?

NOTE TO TEACHERS. — The exercises given below are suggestive of many others that can be made from the table. It is designed for a page that can be turned to for drill work as needed.

1-10. Find the sum of the numbers in each line.

11-15. Add the first *five* numbers in each column.

16-20. What is the sum of *f g h i j* in each column ?

21-25. Add the first *six* numbers in each column.

26-30. Add the last *seven* numbers in each column.

31-35. Add the first *eight* numbers in each column.

36-40. Find the footing of each column.

	K	*L*	*M*	*N*	*O*	
a	\$ 24.75	\$ 63.78	\$ 129.82	\$ 637.91	\$ 946.87	*a*
b	15.45	26.56	376.71	487.82	598.93	*b*
c	69.99	71.91	828.24	937.35	146.46	*c*
d	24.14	35.25	463.67	574.78	685.89	*d*
e	78.18	89.29	913.14	124.26	235.37	*e*
f	33.63	44.74	558.56	669.65	771.78	*f*
g	87.27	98.38	194.91	215.12	326.23	*g*
h	42.71	53.82	649.34	751.45	862.56	*h*
i	96.36	17.47	285.87	396.98	417.19	*i*
j	51.82	62.93	731.49	842.58	953.67	*j*

Find the difference between numbers in columns : —

41-50. *K* and *L*.   **71-80.** *N* and *O*.   **101-110.** *M* and *O*.

51-60. *L* and *M*.   **81-90.** *K* and *M*.   **111-120.** *K* and *N*.

61-70. *M* and *N*.   **91-100.** *L* and *N*.   **121-130.** *L* and *O*.

1. What sum should you obtain by putting together 8 cents, 4 cents, 7 cents, and 6 cents? Did you find this result by adding or multiplying?

We put *unequal* numbers of the same kind together into one large number, called the *sum* or *amount*, by **Addition**.

2. How much money will a purse contain if you put 10 5-cent pieces into it? Did you add or multiply to get your result? How may you prove that you are right?

We generally put *equal* numbers of the same kind together into one number or *product* by **Multiplication**. We may do this by addition, but the process is much longer.

3. $\$6 + \$7 + \$8 + \$9 = $ what?

4. $\$8 + \$8 + \$8 + \$8 + \$8 + \$8 + \$8 = $ what?

5. $6 \times 4 = ?$ $6 \times \$4 = ?$ **8.** $5 \times 40 = ?$ $5 \times \$40 = ?$

6. $8 \times 9 = ?$ 8×9 lb. $= ?$ **9.** $6 \times 20 = ?$ 6×20 days $= ?$

7. $7 \times 8 = ?$ 7×8 qt. $= ?$ **10.** $7 \times 90 = ?$ 7×90 tons $= ?$

11. What are two equal parts of 12? Two unequal parts?

12. $- \times - = 21$; $- \times - = 63$; $- \times - = 54$.

13. $- \times - = \$21$; $- \times - = \$63$; $- \times - = 54$ pt.

14. What two numbers multiplied together make 28? 35?

15. 49 is the product of what? 56? 81? 84? 96? 100?

16. $\$49$ is the product of what? $\$56$? $81\cancel{c}$? 84 miles?

17. Give the two **factors** (or makers) of 56; 60; 48; 72; 108; 144.

18. Give the two factors of $\$56$; 121 ft.; 120 inches.

1. Of these numbers, which apply to things that can be seen, handled, or measured?   5 books; 3 ft.; $9; 15; 6 gal.; 23; 10 lb.; 14; 7 strokes.

2. Which of these numbers are not connected with things of any kind?

Numbers that are applied to things of any kind are called **concrete** *numbers.*   Name five concrete numbers.

Numbers used without reference to things of any kind are called **abstract** *numbers.*   Name some abstract numbers.

3. In what respect are 9 ft. and 11 ft. alike?   Can you think of any respect in which 5 gal. and 8 hr. are alike?

Like numbers have units of the same name and size.

4. Mention three like numbers; four that are unlike. Why are all abstract numbers like numbers?

5. Using the objects, actually multiply 2 pencils or 2 books by 3.   Which of these numbers do you see and handle?   Which is abstract?   Of what use is the abstract number?

6. $6 \times \$8 = \$48$.   How many numbers are used in this example?   Which of them are like numbers?   Why?

7. Which is more, $2 \times 3 \times 4$ inches or $3 \times 4 \times 2$ inches?

Remember these **Principles in Multiplication.** — 1. *Only one factor can be concrete.*

2. *The product and the concrete factor must be like numbers.*

3. *The order in which the factors are used will not affect the product.*

1. If we are to find the cost of 6 pounds of rice at 8¢ per pound, which is the **multiplicand,** or number to be multiplied? What is the **multiplier,** or factor that shows how many times the number to be multiplied is· taken? What is the **product**?

2. How many days in 6 weeks? What is the multiplier? The multiplicand? The product?

3. Show what principles of multiplication given on the preceding page are illustrated in Exercise 2.

4. Compare $6 \times 7 \times 8$, $6 \times 8 \times 7$, and $8 \times 7 \times 6$. What principle does this illustrate?

5. Compare $12 \times \$3$ with $3 \times \$12$.

6. How many days are there in 352 weeks?

A	*B*
7 days	352
352	7 days
14	2464 days
35	
21	
2464 days	

EXPLANATION. — 1 week is 7 days ; 352 weeks are 352×7 days, or 2464 days. We save six· figures in the work by using the smaller factor 7 as the multiplier. To shorten the work we may multiply as in *B*, for $7 \times 352 = 352 \times 7$, nevertheless, we must think and talk of the *concrete* factor, 7 days, as one of the 352 equal numbers to be put together.

Change : —

7. 425 wk. to days.

8. 785 yd. to feet.

9. 649 gal. to quarts.

10. 427 da.. to hours.

Find the cost of : —

11. 644 chairs @ $3.

12. 197 desks @ $5.

13. 623 volumes @ $7.

14. 865 tons @ $9.
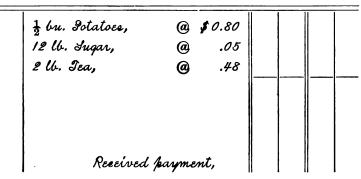
1. What is a merchant?

2. A merchant buys flour at $5 a barrel and sells it for $5.25. He gains —— on each barrel.

3. To gain one dollar he would have to sell —— barrels.

4. If Harry buys bananas for 15 cents a dozen, and sells them at 2 cents each, how much does he make on every dozen? Explain $12 \times 2 - 15 =$ ——.

5. A dealer bought coal at $4.75 a ton, and sold it for $5.50. What did he gain on the ton?

6. If you should buy a knife for 37¢ and sell it for a half-dollar, what would you gain?

7. Charles' father bought him a bicycle for $37. After 6 months it was sold for $34.50. What was lost?

8. A peddler bought a bunch of 108 bananas for $1, and sold them at 20 cents a dozen. He gained ——.

9. When a grocer buys pepper for 11 cents a pound and sells it for 16 cents a pound, he makes —— cents on every pound, or —— cents on 10 pounds.

10. If I gain 10 cents on every book I sell, to gain 80 cents I must sell —— books. $80 \div 10 =$ ——.

11. I bought a ball for $1, and sold it for 75¢. I lost ——.

12. A farmer bought a horse for $100. He traded his horse for a yoke of oxen and sold the oxen for $120. He gained —— dollars.

13. A provision dealer buys meat at wholesale for 12 cents a pound, and retails it at 16 cents. How much does he gain on 12 pounds?

1. Copy and fill out the following **Bill of Sale** : —

CHICAGO, Dec. 5, 1904.

Mr. E. F. Brown.

Bought of WALLACE & COLE.

½ bu. Potatoes,	@	$ 0.80
12 lb. Sugar,	@	.05
2 lb. Tea,	@	.48

Received payment,

WALLACE & COLE,
By Jones.

2. In the bill shown above, what is the **Date of Purchase** ?

3. Who was the **buyer** ? The **seller** ?

4. Has the bill been paid ? What was the name of the clerk that **receipted** it ?

Make bills of the following sales, using your teacher's name as buyer, some merchant near you as seller, and yourself as clerk. Receipt the bill.

5.	**6.**
3 pt. milk at 4¢	3 yd. ribbon at 12¢
½ lb. butter at 30¢	4½ yd. braid at 8¢
2 lb. cheese at 10¢	6 spools thread at 5¢
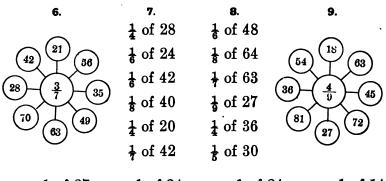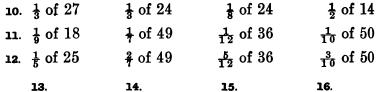
Write a bill for each of the following sales, using any names you choose.
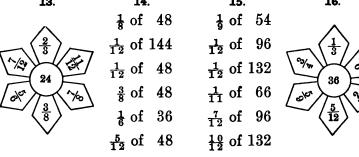
1.	23 lb. coffee	@ $0.35	**2.**	16 yd. gingham	@ $0.42
	6½ lb. tea	@ 0.50		4 doz. buttons	@ 0.16
	7 lb. lard	@ 0.14		12 yd. braid	@ 0.14
3.	5 plows	@ $.16	**4.**	23 hogs	@ $ 9.
	7 drills	@ 32		16 cows	@ 42.
	5 wagons	@ · 83		63 sheep	@ 7.
5.	78 lb. codfish	@ 6¢	**6.**	5 gal. alcohol	@ $2.32
	56 lb. halibut	@ 18¢		8 gal. ammonia	@ 0.16
	2 bbl. herring	@ $3.75		7 lb. camphor	@ 0.48

Problems

7. Find the cost of 11 lb. coffee at $0.38 per pound and 8 lb. of tea at $0.75 per pound.

8. When 8 lb. of tea costs $6.25, what will 24 lb. cost? HINT. — 24 lb. will cost how many times as much as 8 lb.?

9. When 3 barrels of apples cost $9.75, what will 12 barrels cost? HINT. — 12 is how many times 3?

10. A boy earned $1.32 by selling chestnuts at 6¢ per quart. How many quarts did he sell?

11. I bought goods amounting to $6.73, and gave in payment a $10 bill. What change did I receive?

12. If I pay a debt of $23.42 with 3 ten-dollar bills, what change do I receive?

1. $\frac{1}{4}$ of 32 $\frac{1}{6}$ of 54 $\frac{1}{8}$ of 56 $\frac{1}{9}$ of 36 $\frac{1}{7}$ of 35

2. $\frac{1}{8}$ of 72 $\frac{1}{5}$ of 20 $\frac{1}{9}$ of 72 $\frac{1}{9}$ of 45 $\frac{1}{9}$ of 63

3. $\frac{1}{7}$ of 21 $\frac{1}{9}$ of 81 $\frac{1}{6}$ of 12 $\frac{1}{4}$ of 16 $\frac{1}{6}$ of 30

4. $\frac{1}{5}$ of 40 $\frac{1}{8}$ of 16 $\frac{1}{8}$ of 32 $\frac{1}{5}$ of 35 $\frac{1}{5}$ of 45

5. $\frac{1}{7}$ of 28 $\frac{1}{6}$ of 18 $\frac{1}{3}$ of 21 $\frac{1}{7}$ of 56 $\frac{1}{10}$ of 40

6.   **7.**   **8.**   **9.**

7. $\frac{1}{4}$ of 28
$\frac{1}{6}$ of 24
$\frac{1}{6}$ of 42
$\frac{1}{8}$ of 40
$\frac{1}{4}$ of 20
$\frac{1}{7}$ of 42

8. $\frac{1}{6}$ of 48
$\frac{1}{8}$ of 64
$\frac{1}{7}$ of 63
$\frac{1}{9}$ of 27
$\frac{1}{4}$ of 36
$\frac{1}{5}$ of 30

10. $\frac{1}{3}$ of 27 $\frac{1}{3}$ of 24 $\frac{1}{8}$ of 24 $\frac{1}{2}$ of 14

11. $\frac{1}{9}$ of 18 $\frac{1}{7}$ of 49 $\frac{1}{12}$ of 36 $\frac{1}{10}$ of 50

12. $\frac{1}{5}$ of 25 $\frac{2}{7}$ of 49 $\frac{5}{12}$ of 36 $\frac{3}{10}$ of 50

13.   **14.**   **15.**   **16.**

14. $\frac{1}{8}$ of   48
$\frac{1}{12}$ of 144
$\frac{1}{12}$ of   48
$\frac{3}{8}$ of   48
$\frac{1}{6}$ of   36
$\frac{5}{12}$ of   48

15. $\frac{1}{9}$ of   54
$\frac{1}{12}$ of   96
$\frac{1}{12}$ of 132
$\frac{1}{11}$ of   66
$\frac{7}{12}$ of   96
$\frac{10}{12}$ of 132

1. Six, 8, and 7 are the parts of what number ?

2. Gladys had $ 3.75 in her bank, but took out a half dollar. How much had she left ?

3. Howard has 12 nickels in his bank. How much more than fifty cents would you give him for them ?

4. Edward exchanges 200 pennies for half dollars. How many does he get ?

5. $\frac{1}{12}$ of 84 ¢ is ———.

10. $\frac{3}{4}$ in. $+ \frac{1}{2}$ in. $=$ ——— in.

6. $ 9 is $\frac{1}{8}$ of ———.

11. $\frac{3}{8}$ of 24 min. $=$ ——— min.

7. 12 ¢ is $\frac{1}{9}$ of ———.

12. $\frac{2}{3}$ of a yr. $=$ ——— mo.

8. $3\frac{1}{4}$ gal. are ——— qt.

13. A bushel bag holds ——— qt.

9. $\frac{1}{2}$ a day is ——— hour.

14. 1 yd. and 6 in. $=$ ——— in.

15. How many badges 3 in. long will a yard of blue ribbon make ?

16. Sarah Field bought a book for 20 ¢, a slate for 15 ¢, a pencil for 3 ¢, and a 1 ¢ sponge. She gave the clerk a dollar. Count back the change.

17. What should you pay for 6 postal cards and 12 2-cent stamps ?

18. It costs $\frac{1}{2}$ cent an ounce to send a book by mail. How many 2-cent stamps will pay the postage on a book weighing 12 ounces ?

19. Begin at 100 and count backward by 7's.

20. How many weeks in a month of 30 days ?

21. When 1 pound costs 12 ¢, what will 5 pounds cost ?

22. When 5 yards cost 60 cents, what will 7 yards cost ?

1. Compare 10×8 with 8×10.

2. $10 \times 6 =$ ——; $6 \times 10 =$ ——; 10 6's are ——; 6 10's are ——.

3. $\frac{1}{10}$ of 80? $\frac{1}{10}$ of 60? $\frac{1}{10}$ of 120? $\frac{1}{10}$ of 100?

4. What is the effect of annexing a zero to 8? Of removing the zero from 80?

5. If annexing a zero to 8 multiplies it by 10, how may you multiply 7 by 10? 9 by 10? 12 by 10?

6. $10 \times 13 =$ ——; $10 \times 15 =$ ——; $10 \times 25 =$ ——.

7. If removing the zero from 80 divides it by 10, how may you divide 90 by 10? 70 by 10? 120 by 10?

8. $\frac{1}{10}$ of 60 is ——; $\frac{1}{10}$ of 110 is ——; $\frac{1}{10}$ of 130 is?

9. 10×23?   **10.** 10×49?   **11.** $\frac{1}{10}$ of 230?

12. Compare 6×100 with 100×6? 6×1 hundred $= 6$ hundred, or $6 \times 100 = 600$, then $100 \times 6 =$ ——.

13. To get 600, what do we annex to 6? 600 are how many times 6? By what do we multiply 6 when we annex two zeros?

14. How do you multiply 7 by 100; 8 by 100?

15. If $100 \times 6 = 600$, what is $\frac{1}{100}$ of 600?

16. Removing *two* zeros from 600 gives ——, and is the same as taking $\frac{1}{100}$ of it, or dividing it by ——.

Principles. — 1. *Every zero annexed to a whole number multiplies it by* 10.

2. *Every zero removed from the right of a whole number divides it by* 10.

Multiply : —

1.	18 by 10.	**5.**	5 by 100.	**9.**	96 by 10.
2.	27 by 10.	**6.**	25 by 100.	**10.**	84 by 100.
3.	63 by 10.	**7.**	32 by 100.	**11.**	385 by 10.
4.	95 by 10.	**8.**	76 by 100.	**12.**	20 by 10.

Divide : —

13.	760 by 10.	**17.**	800 by 100.	**21.**	920 by 10.
14.	890 by 10.	**18.**	1200 by 100.	**22.**	3600 by 100.
15.	420 by 10.	**19.**	6500 by 100.	**23.**	750 by 10.
16.	640 by 10.	**20.**	8700 by 100.	**24.**	8000 by 10.

25. Compare $200 \times \$4$ with $100 \times 2 \times \$4$.

26. Compare $300 \times \$7$ with $100 \times 3 \times \$7$.

27. What is 400×9? 500×7? 40×9?

Written

1. What will 500 tons of hay cost at $\$17$ a ton?

WORK

$\$17$

500

———

$\$8500$

EXPLANATION. — 500 tons will cost $500 \times \$17$. $500 = 100 \times 5$; $500 \times \$17$ is the same as $100 \times 5 \times \$17$. Multiplying $\$17$ by 5, we get $\$85$. We multiply $\$85$ by 100 by annexing two zeros, and get $\$8500$, the cost of 500 tons.

What will be the cost

2. Of 70 tons of hay at $\$18$ per ton?

3. Of 40 tons of hay at $\$16$ per ton?

4. Of 600 tons of coal at $\$8$ per ton?

5. Of 800 cords of wood at $\$12.25$ per cord?

1. What will 37 lb. of butter cost at 25 ⍧ a pound ?

REMARK. — 25 cents may be written $ 0.25. In writing cents after $, it is best to place a zero before the point to show that there are no dollars.

Always separate dollars from cents by a **decimal point.**

What will be the cost of : —

2. 37 gal. oil @ $ 0.19 ?   **5.** 64 yd. carpet @ $ 0.97 ?

3. 48 bu. oats @ $ 0.59 ?   **6.** 75 lb. tea @ $ 0.63 ?

4. 59 yd. silk @ $ 0.87 ?   **7.** 89 lb. coffee @ $ 0.55 ?

Find the entire cost of : —

8. 3 doz. eggs @ $ 0.25 ; 2 gal. molasses @ $ 0.45.

9. 5 cans tomatoes @ $ 0.13 ; 6 cans corn @ $ 0.14.

10. ½ lb. nutmegs @ $ 0.80 ; 3 lb. raisins @ $ 0.35.

11. 1½ lb. steak @ $ 0.30 ; 6 lb. codfish @ $ 0.15.

Find the product of : —

12. 428 × $ 3.87.   **15.** 123 × $ 9.87.   **18.** 345 × $ 6.49.

13. 75 × $ 4.93.   **16.** 846 × $ 6.49.   **19.** 678 × $ 5.87.

14. 69 × $ 8.43.   **17.** 927 × $ 5.28.   **20.** 925 × $ 6.93.

WORK

```
  $318
   203
   954
 63600
$64554
```

EXPLANATION. — 203 = 200 + 3 ; 203 × $ 318 = 3 × $ 318 + 200 × $ 318. 3 × $ 318 = $ 954 ; 200 × $ 318 = $ 63,600. The sum of $ 954 and $ 63,600 is $ 64,554. In practice we omit the zeros in the second partial product.

1. Find the cost of 36 pounds of coffee at 36 cents a pound, and 58 pounds of sugar at 6 cents a pound.

2. I paid a 20-dollar bill for 4 sheep at $3.50 each. How much " change " did I receive?

3. If I divide $37.50 equally among 5 boys, how much does each boy receive?

4. What is the cost of 37 lb. coffee at 48 cents a pound?

5. I exchange eggs at 14 cents a dozen for tea at 70 cents a pound. How many pounds can I buy with 25 dozen eggs?

6. I purchased 30 axes at $8 a dozen. How much did they cost me?

7. I earn $1500 a year; my expenses are $950. How much can I save in 10 years?

8. I went to town with $17.62 in my purse; I expended $10.11, and returned with $6.51. How much had I lost?

Find the product made by these factors : —

Note. — Select a multiplier that will give but two partial products.

9. 509×648.   12. 907×648.   15. 897×707.

10. 704×945.   13. 806×394.   16. 608×984.

11. 157×803.   14. 507×849.   17. 605×982.

18. In one mile there are 5280 feet. How many feet in 709 miles?

1. If your gas bill is $2.75 per month, what is that per year?

2. If I earn $90 per month and spend $56, what do I save in a year?

3. What is the cost of 13 lb. of sugar at 6¢ per pound and 5 lb. coffee at 35¢ per pound? Make and receipt the bill.

4. A gentleman who died left $9000 to his family. Each of the 4 children was to receive $1750, and the wife the rest. What did the wife receive?

5. A farmer sold 365 bushels of potatoes at 45¢ and 302 bushels at 54¢. What did he receive for all?

6. How many square inches in an oblong 15 inches wide and 23 inches long?

7. A merchant bought 300 barrels of flour at $4.25 each, and paid $18.75 freight. What was the total cost of the flour?

8. If 9 acres of land cost $918, what will 18 acres cost at the same price? (Do not find the cost of one.)

9. Coal cost $8.25 per ton and 25 cents extra for putting it in. What will be the total cost of 15 tons?

10. My salary is $1800 per year. If I save $\frac{1}{6}$ of it, what do I spend?

11. Find the cost of 27 lb. of sugar at 7¢ per pound and 7 lb. of tea at 78¢. Make and receipt the bill.

1. I sell a house and lot for $4865. If this is a loss of $690, what did the property cost me?

2. I sold a house for $3968, thereby making $275. What did I pay for the house?

3. I have three horses that cost me $498. If I sell one for $235, another for $155, and the other for $125, how much do I gain?

4. I pay 56 cents a bushel for potatoes, and sell them at a profit of ¼ the cost. At what price do I sell? What do I gain on 98 bushels?

5. I bought a field of 10 acres for $1000; I sold 7 acres of it at $125 an acre, and the rest at $85 an acre. How much did I gain?

6. If there are 25 cakes of soap in a box, and I sell it for 10¢ a cake, what do I make on a box if it costs me 75 cents?

7. I bought a horse for $360, and sold it so as to gain ⅓ as much as the cost. What did I get for it?

8. I buy paper at 12 cents a pound, and sell it for 20 cents a pound. What do I gain on 548 pounds?

9. If I buy butter at 20 cents a pound, and sell it to gain ⅕ the cost, what do I receive for 245 pounds?

10. I bought coffee at 23¢ per pound, and sold it for 38¢, what did I gain on a bag containing 324 pounds?

11. A grocer buys canned corn at $1.00 per dozen, and sells it so as to gain ⅕ the cost. What does he make on 24 dozen?

1. We measure short distances in *feet* and *inches*.
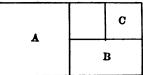
| A foot | = 12 inches. | 1 ft. | = 12 in. |
| A yard | = 3 feet. | 1 yd. | = 36 in. |

2. The picture above shows a measure —— inches long.   4 in 12 —— times.   4 inches = 1/? of a foot.

3. $\frac{1}{2}$ foot = —— in.; $\frac{1}{4}$ ft. = —— in.; $\frac{1}{6}$ ft. = —— in.; $\frac{1}{12}$ ft. = —— in.

4. How wide is the cover of this book? How long is it?

5. How long is your slate inside the frame? How wide?

6. Make lines 1 in., 2 in., 3 in., 4 in., 5 in., and 6 in. long.

7. The shortest distances are measured in **parts of an inch.** In the picture above, each inch is divided into —— equal parts, called **fourths,** or **quarters.**

8. Each inch is also divided by a vertical line a little longer than the others into —— equal parts, called **halves.**

9. How many *half-inches* in an inch? How many *fourths of an inch* in an inch?

10. Draw a line $\frac{1}{2}$ in. long.   Divide it into 2 equal parts. How long is each part? $\frac{1}{2}$ in. = —— fourths.

1. A figure like this is called an **oblong**. It resembles a ——, except that it is *longer* than it is *wide.*

2. Into how many equal parts was the oblong divided to get A? Then A is what part of the oblong?

3. If the oblong had been divided into parts like B, how many would there have been? Then what part of the oblong is B?

4. How many parts like C will make the whole oblong? What part of the oblong is C?

5. $\frac{1}{2}+\frac{1}{2}=$ —— ; $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=$ —— ; $\frac{1}{4}+\frac{1}{4}+\frac{1}{2}=$ ——.

6. Look at the figure and tell what $\frac{1}{4}+\frac{1}{8}+\frac{1}{8}$ equals.

7. $\frac{2}{8}+\frac{1}{2}=\frac{?}{4}$; $\frac{1}{2}+\frac{1}{4}+\frac{2}{8}=$ —— ; $1-\frac{1}{8}=$ ——.

8. Compare $\frac{1}{2}$ and $\frac{1}{4}$ thus : $\frac{1}{2}$ is 2 times $\frac{1}{4}$; $\frac{1}{4}$ is $\frac{1}{2}$ of $\frac{1}{2}$.

9. Compare $\frac{1}{4}$ and $\frac{1}{8}$; $\frac{1}{2}$ and $\frac{1}{8}$.

10. Cut an apple into 8 equal parts. What is each part called? How many of these eighths make one fourth of the apple?

11. If I spend $\frac{1}{2}$ of my money, I shall have —— left.

12. If I spent $\frac{1}{4}$ of my money, I shall have —— left.

13. Draw an oblong; divide it into 8ths; erase $\frac{1}{8}$. How many 8ths remain? $1=\frac{?}{8}$; $1-\frac{1}{8}=\frac{?}{8}$; $1=\frac{1}{8}+\frac{?}{8}$.

14. $\frac{1}{4}=$ how many 8ths? Add $\frac{1}{8}$ and $\frac{1}{4}$, and we have —— 8ths.

15. $\frac{3}{4}+\frac{3}{8}=\frac{?}{8}$. In $\frac{6}{8}$ of the oblong there are —— 4ths.

1. Some articles of merchandise are sold by **measure**, some by **count**, and some by **weight**.

Vinegar, oil, and —— are sold by the —— or ——. Potatoes and —— are sold by the —— or ——. Eggs, lemons, and —— are sold by the ——. Butter, cheese, and —— are sold by the ——, and coal and hay by the ——. Cloth and —— are sold by the ——. Time is measured in ——.

2. —— pt. = 1 qt.   **3.** 8 —— = 1 pk.   **4.** —— in. = 1 ft.
—— qt. = 1 gal.   —— pk. = 1 bu.   —— ft. = 1 yd.

16 ounces (oz.) **are 1 pound** (lb.)
2000 lbs. are 1 ton (T.)

5. 3 quarts = —— pints; 2 gal. = —— qt.; $2\frac{1}{2}$ gal. = —— qt.

6. At 2¢ each, a dozen eggs will cost ——¢. $12 \times 2 =$ ——.

7. At 20¢ a doz., $\frac{1}{2}$ doz. of lemons will cost ——¢. $\frac{1}{2}$ of 20 is ——.

8. $\frac{1}{2}$ doz. + $\frac{1}{3}$ doz. = ——; $2\frac{1}{2}$ doz. = ——.

9. In 1 foot there are —— inches; in —— feet, or 1 yard, there are —— × —— inches, or ——.   A yard stick is —— inches long.

10. $\frac{1}{2}$ a yard stick is —— inches long; $\frac{1}{3}$ of 36 in. = —— in.

11. When 1 yard of ribbon costs 16 cents, $1\frac{1}{4}$ yards will cost —— cents. $1 \times 16 + \frac{1}{4}$ of $16 =$ ——.

12. 1 lb. = 16 oz.; $\frac{1}{2}$ lb. = —— oz.; $\frac{1}{4}$ lb. = —— oz.

1. How many inches in 10 feet?
2. How many feet in 144 inches?
3. How many inches in 4 feet and 2 inches?
4. How many feet in 100 inches?
5. How many yards in 27 feet?
6. How many feet in 27 yards?
7. How many feet in 10 yards and 2 feet?
8. How many yards in 20 feet?
9. How many pounds in 300 ounces?
10. How many ounces in 300 pounds?
11. How many ounces in 10 pounds and 8 ounces?
12. How many pounds in 75 ounces?
13. I have 4 lb. of sugar put in 8 packages. How many ounces in each package?
14. How many 2 oz. packages of cloves can the grocer make from 4 pounds?
15. How many times can a quart pail be filled from a milk can holding 12 gallons?
16. Find the cost of 3 bu. 3 pk. of nuts at 20¢ a peck.
17. Find the cost of 1 bu. 3 pk. of nuts at 5¢ a quart.
18. Find the cost of 2 bu. cherries at 8¢ a quart.
19. Find the cost of 12 gallons of milk at 6¢ a quart.
20. What does a grocer get for 5 lb. of cloves at 5¢ an ounce?
21. What are 24 bushels of peaches worth at 35¢ a peck?
22. What are 8000 lb. of coal worth at $8 a ton?

1. Divide 784 by 8.

WORK

8)784
  98

Observe that in the work at the left some of the numbers were carried in the mind and not written. In the work at the right, all the numbers used are written down, hence this process, requiring more figures, is called **long division,** and is the method used when the divisor is larger than 12.

WORK

    98
8)784
    72
    64
    64

2. $111 \div 20.$	**6.** $374 \div 90.$	**10.** $146 \div 60.$
3. $245 \div 60.$	**7.** $285 \div 40.$	**11.** $278 \div 80.$
4. $372 \div 70.$	**8.** $362 \div 80.$	**12.** $370 \div 90.$
5. $463 \div 50.$	**9.** $178 \div 50.$	**13.** $164 \div 50.$

14. How many times is 21 contained in 897 ?

$42 =$ quotient

divisor $= 21)897 =$ dividend

        84
        ——
        57

        42
        ——
        15 = remainder

EXPLANATION. — 89 tens ÷ 21 = 4 tens. Place the 4 tens in *tens' place,* over the 9 *tens.* 21 × 4 *tens* = 84 *tens.* 89 tens − 84 tens = 5 tens. 5 tens and 7 ones = 57. 57 ÷ 21 = 2, which is written in the quotient over the 7. 21 × 2 = 42. 57 − 42 = 15. Then the quotient is 42, and the remainder is 15.

Divide these numbers by 21; 31; 41; 51; 61; 71; 81; 91 : —

15. 849	949	1592	6945	9478
16. 975	643	2436	7391	6492

1. $276 + 953 - 462 = ?$
2. $254 + 758 \times 6 = ?$
3. $9 \times 732 - 859 = ?$
4. $6 \times 4374 \div 9 = ?$
5. $7 \times 8 \times 9 \times 5 = ?$

6. $875 - ? = 412.$
7. $6 \times ? = 9468.$
8. $842 \times 75 = 2 \times ?$
9. $9 \times ? = 54{,}729.$
10. $15 \times \$3.46 - \$10.$

Find the quotient of : —

11. $7240 \div 50.$
12. $6839 \div 51.$
13. $7294 \div 52.$
14. $8476 \div 53.$
15. $4782 \div 54.$

16. $6943 \div 55.$
17. $7382 \div 56.$
18. $9465 \div 57.$
19. $8476 \div 58.$
20. $9371 \div 59.$

Multiply : —

21. 457 by 208.
22. 689 by 340.
23. 473 by 607.
24. 251 by 402.
25. 864 by 308.

26. Find $\frac{1}{63}$ of 2476.
27. Find $\frac{1}{72}$ of 1728.
28. Find $\frac{1}{80}$ of 9440.
29. Find $\frac{1}{25}$ of 7250.
30. Find $\frac{4}{9}$ of 7533.
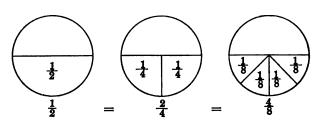
31. What shall I pay for 8 tons of coal at $7.36 a ton ?

32. What does a pair of mittens cost when a dozen sell for $37.50 ?

33. In a case of 24 doz. eggs, 132 were broken. How many dozen were unbroken ?

$$\tfrac{1}{2} \quad = \quad \tfrac{2}{4} \quad = \quad \tfrac{4}{8}$$

1. Compare $\tfrac{1}{2}$ and $\tfrac{1}{4}$; $\tfrac{1}{2}$ and $\tfrac{1}{8}$; $\tfrac{1}{4}$ and $\tfrac{1}{8}$.

2. $\tfrac{1}{2}+\tfrac{1}{4}=$ —— fourths; $\tfrac{1}{2}+\tfrac{1}{4}+\tfrac{1}{8}=$ —— eighths.

3. $\tfrac{1}{2}-\tfrac{1}{8}=$ —— eighths; $\tfrac{1}{4}-\tfrac{1}{8}=$ —— eighths.

4. .$1=$ —— halves, or —— fourths, or —— eighths.

5. $1-\tfrac{3}{8}=$ —— eighths; $1-\tfrac{1}{4}=\tfrac{?}{4}$; $1-\tfrac{3}{4}=$ ——.

6. When $\tfrac{1}{2}$ pound of tea costs 20 cents, what should I pay for $\tfrac{1}{4}$ lb.?

7. When $\tfrac{1}{2}$ dozen oranges cost 30 cents, what will $\tfrac{1}{4}$ dozen cost?

8. When $\tfrac{1}{2}$ pound of pepper costs 40 cents, what will $\tfrac{1}{8}$ of a pound cost?

9. When $\tfrac{1}{4}$ lb. of tea costs 25¢, what is that per pound?

10. When $\tfrac{1}{8}$ bushel of potatoes costs 15¢, what will $\tfrac{1}{4}$ of a bushel cost? $\tfrac{1}{2}$ bushel? A bushel?

11. 8 pints are equal to 1 gallon. A pint is what part of a gallon? 2 pints are equal to what part? 4 pints to what part?

12. 4 pecks = 1 bushel. 2 pecks = —— bushel. 3 pecks $=\tfrac{?}{4}$ bu.?

13. $6=$ what part of a dozen? $3=$ what part of a dozen?

18          $\frac{1}{3}$ of 18 $\frac{2}{3}$ of 18

1. Show by a diagram $\frac{1}{5}$ of 20; $\frac{2}{5}$ of 20; $\frac{3}{5}$ of 20; $\frac{4}{5}$ of 20.

2. $\frac{3}{5}$ of .20 means that 20 is to be divided into —— parts and —— of these parts taken.

3. $\frac{5}{6}$ of 18 is —— for $\frac{5}{6}$ of 18 means $5 \times$ —— of 18 which is ——.

4. $\frac{3}{4}$ of 48.	**11.** $\frac{5}{8}$ of 48.	**18.** $\frac{2}{3}$ of 33.
5. $\frac{5}{6}$ of 30.	**12.** $\frac{7}{9}$ of 63.	**19.** $\frac{5}{7}$ of 63.
6. $\frac{3}{7}$ of 28.	**13.** $\frac{2}{9}$ of 45.	**20.** $\frac{6}{11}$ of 66.
7. $\frac{2}{5}$ of 45.	**14.** $\frac{6}{7}$ of 42.	**21.** $\frac{7}{12}$ of 84.
8. $\frac{3}{8}$ of 24.	**15.** $\frac{9}{10}$ of 70.	**22.** $\frac{8}{11}$ of 44.
9. $\frac{4}{9}$ of 27.	**16.** $\frac{7}{9}$ of 72.	**23.** $\frac{6}{7}$ of 56.
10. $\frac{5}{7}$ of 35.	**17.** $\frac{6}{7}$ of 49.	**24.** $\frac{9}{10}$ of 80.
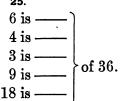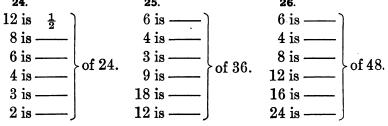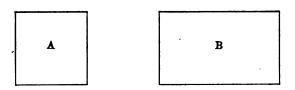
NOTE. — Some of the examples may be illustrated by diagrams.

24.
12 is $\frac{1}{2}$
8 is ——
6 is ——
4 is ——   } of 24.
3 is ——
2 is ——

25.
6 is ——
4 is ——
3 is ——
9 is ——   } of 36.
18 is ——
12 is ——

26.
6 is ——
4 is ——
8 is ——
12 is ——   } of 48.
16 is ——
24 is ——
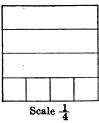
1. We measure **lengths** in *inches, feet,* and *yards.*

2. We measure **surfaces** in *square inches, square feet,* and *square yards.*

3. How many sides has a square? How do they compare in length?

4. Show a square on this page. How long is one side?

5. A square whose sides are each one inch is a ——.

6. Lines that meet form **angles.** When they meet as the sides of a square, they form **right angles.**

The sides of a square are all equal, and the angles are all right angles.

7. Describe diagram B on this page.

8. *A flat surface whose sides are straight lines and whose angles are all right angles is a* **rectangle.** Is a square a rectangle?

9. How does a figure like B differ from a square? A rectangle longer than it is wide is an ——.

10. Make a 2-inch square; that is, a square whose sides are each 2 inches. How many square inches does it contain?

11. Make a 3-inch square. How many square inches does it contain?

1. Build a 4-inch square from 1-inch squares. How many square inches in a row? How many rows? How many square inches in all?

2. Draw a 5-inch square to the scale of $\frac{1}{4}$; that is, let $\frac{1}{4}$ inch represent an inch. Divide it into oblongs 1 inch wide and 5

Scale $\frac{1}{4}$
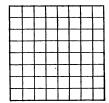
inches long. How many square inches in each oblong? How many oblongs? A 5-inch square contains —— sq. in.

3. Can we draw an 8-inch square on this page? Why? Below we have drawn an 8-inch square on "a scale of $\frac{1}{8}$"; that is, $\frac{1}{8}$ in. represents 1 inch.

Scale $\frac{1}{8}$

4. To find the number of square inches in an 8-inch square, *first* find the number of oblongs 1 inch wide and 8 inches long. How many? *Then* find the number of square inches in each oblong. How many?

Then an 8-inch square contains 8 × 8 sq. in. or ——.
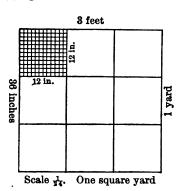
Draw these rectangles on a $\frac{1}{4}$ scale, and find the number of square inches in each : —

5. 12 in. long and 5 in. wide.　7. 10 in. long and 7 in. wide.

6. 9 in. long and 7 in. wide.　8. 12 in. square.

1. Find, as on the preceding page, the number of square inches in a 12-inch square.

2. What other name may we give a 12-inch square?

3. Cut a piece of paper a foot square and divide the surface of one side into square inches. How many?

A square foot contains 144 square inches.

4. On the blackboard draw a 3-foot square.

5. What other name may we give it?

6. Divide it into oblongs 1 foot by 3 feet. How many such oblongs? How many square feet in each? Then how many square feet in a square yard?

3 feet

12 in.

12 in.

36 inches

1 yard

Scale $\frac{1}{12}$. One square yard

A square yard contains 9 square feet.

Draw diagrams and find the area of oblongs that are: —

7. 12 feet long and 8 feet wide.

8. 16 feet long and 4 feet wide.

9. 9 feet long and 7 feet wide.

10. 15 feet long and 9 feet wide.

11. How many square yards in the ceiling of a room 4 yards wide and 7 yards long?

12. How many square feet in a wall 15 feet long and 9 feet high? How many square yards?

1. How many square inches in the upper surface of a table 48 inches long and 36 inches wide?

2. How many square feet in the floor of a room 28 feet long and 24 feet wide?

3. How many feet of moulding will it take to go around this room?

4. I have a building lot 132 feet long and $\frac{1}{4}$ as wide. How wide is it? How many square feet does it contain?

5. How far will you walk in going 4 times around a square 60 yards long?

6. A square flower bed contains 64 square feet. How many feet long is each side?

7. What is the area of a sidewalk 54 feet long and 4 feet wide?

8. What will it cost to pave this walk at 15 cents a square foot?

9. How many feet around a lot 120 yards long and 64 yards wide?

10. What will it cost to fence this lot with three strands of wire at 5 cents a yard?

11. If you have 984 inches of wire, into how many pieces a foot long can you cut it?

12. How many yards of yard-wide oilcloth will it take to cover a floor 27 feet long and 18 feet wide?

13. What is the cost of a marble slab 4 feet by 2 feet at $ 3.25 a square foot?

1. A number, as $2\frac{1}{3}$, composed partly of a *whole* number and partly of a *fraction* is a **mixed number.** Name other mixed numbers.

2. $2\frac{1}{2} \times \$8$ means $2 \times \$8 + \frac{1}{2}$ of $\$8$ or $\$16 + \$4$.

Find : —

3. $2\frac{1}{2} \times 10$ ft.	**11.** $6\frac{1}{2} \times 8$ quarts.
4. $1\frac{1}{3} \times 12$ yards.	**12.** $7\frac{1}{2} \times 10$ cents.
5. $3\frac{1}{2} \times \$4$.	**13.** $6\frac{1}{2} \times 12\not{e}$.
6. $2\frac{1}{4} \times 16$ bushels.	**14.** $5\frac{1}{3} \times 15\not{e}$.
7. $1\frac{1}{8} \times 24$ men.	**15.** $4\frac{1}{2} \times 10$ quarts.
8. $4\frac{1}{2} \times \$10$.	**16.** $6\frac{1}{3} \times 6$ feet.
9. $3\frac{1}{6} \times 12$ pounds.	**17.** $9\frac{1}{4} \times \$8$.
10. $4\frac{1}{3} \times 9$ quarts.	**18.** $7\frac{1}{5} \times 15$ yd.

Written

1. Find $8\frac{3}{4} \times 196$.

WORK

196
$8\frac{3}{4}$
49
3
147
1568
1715
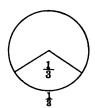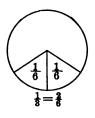
EXPLANATION. — $\frac{1}{4}$ of $196 = 49$; $\frac{3}{4}$ of $196 = 3 \times 49 = 147$; $8 \times 196 = 1568$; $1568 + 147 = 1715$.
Or we may multiply by 3 first and then divide by 4, as in the work at the right.

WORK

196
$8\frac{3}{4}$
4)588
147
1568
1715
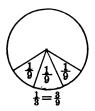
In this way find : —

2. $7\frac{2}{5} \times 125$.	**5.** $8\frac{3}{4} \times 624$.	**8.** $32\frac{3}{4} \times 532$ ft.
3. $9\frac{2}{3} \times 741$.	**6.** $6\frac{3}{8} \times 728$.	**9.** $16\frac{2}{3} \times 726$ yd.
4. $5\frac{4}{5} \times 945$.	**7.** $12\frac{1}{2} \times \$894$.	**10.** $42\frac{3}{5} \times 795$.

1. When 30 sheep are worth $120, find the cost of 60. Why is it unnecessary to find the cost of 1 ? Give a short way of solving the problem.

2. I bought 60 feet of rubber hose at 3¢ per inch. Find the cost.

3. A house and lot cost $13,568. What did the house cost if the lot cost $4795 ?

4. A grocer buys flour at $5.60 per barrel of 196 pounds, and retails it at $4\frac{1}{2}$¢ per pound. What does he make on each barrel ?

5. A dealer bought a 24-pound bucket of candy at 15¢ a pound and retailed it at 2¢ an ounce. What did he make if he got 10¢ for the empty bucket?

6. I sold a horse that cost me $160 so as to make $\frac{2}{5}$ of the cost. What did I get for it ?

7. A grocer bought 10 gal. of vinegar at 20¢ a gallon, and sold it at 5¢ a pint. What did he make ?

8. If I can buy 8 lb. of sugar for 50¢, how much can I buy for $15 ? Compare 50 ¢ and $15.

9. Add $\frac{2}{3}$ of 972 to $\frac{3}{4}$ of 876.

10. I bought one quart of vinegar for 12 cents, one box of ginger for 14 cents, one dozen eggs for 25 cents, and a pound of cream of tartar for 70 cents. How many cents in "change" did I receive from a $2 bill ?

11. What is the cost of 25 pounds of coffee at 38 cents a pound, and 32 pounds of tea at 65 cents a pound ?

1. In the whole of anything there are —— thirds, —— sixths, or —— ninths. $1 = \frac{3}{3} = \frac{6}{6} = \frac{9}{9}$.

2. Compare $\frac{1}{3}$ and $\frac{1}{6}$ thus: $\frac{1}{3} = 2 \times \frac{1}{6}$; $\frac{1}{6}$ is $\frac{1}{2}$ of $\frac{1}{3}$.

3. Compare $\frac{1}{3}$ and $\frac{1}{9}$.

4. If you eat $\frac{1}{3}$ of a pie, what part remains?

5. If an apple is cut into 6 equal parts, what is each part called? $1 - \frac{1}{6} = $——. $1 - \frac{5}{6} = $——.

6. How many feet in a yard?   A foot is what part of a yard?

7. How many inches in $\frac{1}{3}$ yd.?   In $\frac{1}{6}$ yd.?   In $\frac{1}{9}$ yd.?

8. $\frac{1}{3} + \frac{1}{6} = $——sixths; $\frac{2}{3} - \frac{1}{6} = $——; $\frac{2}{3} + \frac{1}{9} = $——ninths.

9. $\frac{2}{3} + \frac{1}{6} = $——; $1 - \frac{5}{9} = $——; $1 - \frac{2}{9} = $——.

10. If $\frac{1}{3}$ of Henry's money is 8 cents, how much has he?

11. Lucy had some pet rabbits.   2 ran away.   This was $\frac{1}{6}$ of all she had.   How many had she?

12. John paid 5¢ for a pencil.   This was $\frac{1}{3}$ as much as he paid for a book.   What did the book cost?

13. 3 pints is $\frac{1}{6}$ of how many quarts?

1. $\frac{1}{2}$ bbl. of flour weighs 98 pounds. What does $\frac{1}{4}$ of a barrel weigh ? What will $1\frac{1}{2}$ barrels weigh ?

2. When $\frac{1}{4}$ ton of hay is worth $5.25, what should I pay for $\frac{1}{2}$ ton ? How much for 1 ton ?

3. When $\frac{1}{8}$ of a farm is worth $3200, what is $\frac{1}{2}$ of it worth ? ($\frac{1}{2}$ is how many times as large as $\frac{1}{8}$?)

4. A farmer sold 20 bushels of potatoes. This was $\frac{1}{4}$ of all he raised. How many did he keep?

5. When onions are $35\cancel{c}$ per peck, what will 6 bushels cost ?

6. When a 20-pound cheese is worth $1.90, what will a 10-lb. cheese cost? Find from your answer the cost of a 30-lb. cheese. The cost of a 90-lb. cheese.

7. A man sold 54 acres, which was $\frac{1}{6}$ of his farm. How many acres remained ?

HINT. — How many 6ths remained ? Compare $\frac{5}{6}$ with $\frac{1}{6}$.

8. After walking $\frac{1}{2}$ the distance to school, a boy has 145 rods yet to go. How many rods does he live from school ?

9. When $\frac{1}{3}$ of a ton of coal costs $2.75, what will a ton cost? What will 15 tons cost ?

10. When $\frac{1}{6}$ of a barrel of apples is worth $85\cancel{c}$, what will 12 barrels of apples cost ?

11. A farmer sold 43 bushels of potatoes. If this was $\frac{1}{8}$ of all he raised, how many did he keep?

12. I spent $\frac{1}{6}$ of my money for a pony. If the pony cost $48, how much have I left ? (Compare $\frac{5}{6}$ with $\frac{1}{6}$.)

Add 43 and 59 thus : 43 and 50 are 93, and 9 are 102. 78 and 67 thus : 78 and 60 are 138, and 7 are 145.

In this way add : —

1. Each number to the one at the right of it, by rows.
2. Each number to the one below it, by columns.

	A	B	C	D	E	F	G	H	I
1	62	96	39	48	62	75	81	48	56
2	53	45	74	26	13	62	67	93	71
3	39	61	48	17	97	39	94	55	39
4	15	23	56	94	71	59	75	36	77
5	19	46	47	69	86	65	63	16	81
6	34	72	84	92	49	83	45	71	19
7	27	83	98	87	44	79	81	35	68
8	75	74	72	44	92	24	85	91	54
9	42	43	83	28	36	61	42	39	76
10	29	52	96	65	47	53	27	75	97
11	32	63	84	83	54	97	56	56	28
12	37	32	75	91	29	69	78	67	18
13	44	94	95	29	97	71	62	38	42
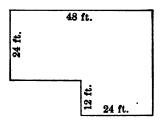
Subtract 67 from 91 thus : $91 - 60 = 31$; $31 - 7 = 24$.

In this way find the difference between : —

3. Each number and the one at the right of it.
4. Each number and the one below it.

1. If 3 coats cost $135, what will 15 cost?

2. How many square inches in 2 square feet?

3. In a pound are 16 ounces. How many ounces in $1\frac{1}{2}$ pounds? In $2\frac{1}{4}$ pounds? In $5\frac{1}{8}$ pounds?

4. When 8 ounces of butter cost 18 cents, what will a pound cost?

5. If James can pick 324 apples in 30 minutes, how many can he pick in 15 minutes?

6. Add $39.62, $481.27, $536.84, $96.82, $10.10, and $37.

7. Henry had 90 marbles. He gave $\frac{1}{3}$ to John, $\frac{1}{6}$ to James, and $\frac{1}{9}$ to Mary. How many remained?

8. How many square feet of plastering in the ceiling of your schoolroom?

9. If I buy a house for $3285 and sell it for $4000, what do I gain?

10. Find the cost of 386 barrels of flour at $4.95 per barrel.

11. How many square yards in a lawn 25 yards wide and 40 yards long?

12. If I pay $3360 for 40 acres of land, what should I have paid for 10 acres of the same land?

13. Find the sum of $396.48, $573.96, $184.27, $986.43, and $1026.

14. The multiplicand is 3468 and the multiplier is 967. What is the product?
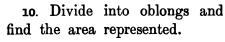
1. A man owned 3 fields, one of 87 acres, one of 54 acres, and the other of 135 acres. He sold the three for $36¾ per acre. What did he get for them?

2. A man sold to one dealer 9 cows for $875.70 and to another 15 at the same price for each. What did he get for all?

3. A farmer raised 495 bushels of beans, but ⅖ of them were damaged by rain. He sold the remainder at $1.60 per bushel. What did he get for them?

4. When 5 knives cost $2.85, what will 50 cost? Is it necessary to find the price of one? Why?

5. I bought a house and lot for $5400. I sold it at a gain of ⅕ of the cost. Find the selling price.

6. What will it cost to paint a floor 24 feet wide and 32 feet long at 7¢ per square foot?

7. There are 16½ feet in a rod. What will it cost to build 50 rods of fence at 3¢ per foot?

8. A grocer paid $28.50 for a 90-pound bag of coffee, and sold it at 42¢ per pound. Find the gain.

9. A lady bought a dress for $28, and a sack for $12, and had $15 left. How much money had she at first?

10. I gave $125 for a horse, $175 for a carriage, $45 for a harness, and $12 for a robe. Find the cost of all.

11. A lady gave $28 for cloth for a dress, $9 for the trimmings, and $12 for making. What was the cost of the dress?
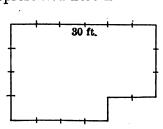
1. This diagram represents the ground plan of a building.

2. One inch represents how many feet?

3. Find each dimension.

4. In how many ways can you divide the figure into two oblongs?

5. What will be the dimensions of each oblong?

6. What is the whole area here represented?

7. How many feet in the sum of the length of the sides?

The sum of the sides bounding a diagram or figure is its perimeter.

8. The perimeter of the plan represented here is ———.

9. Find the perimeter of the plan represented by the diagram in the margin. ($\frac{1}{4}$ in. represents 5 ft.)

10. Divide into oblongs and find the area represented.

1. Short distances are measured in —— and —— Longer distances are measured in yards, rods, and miles.

$$3 \text{ ft.} = 1 \text{ yard (yd.)}$$
$$5\frac{1}{2} \text{ yd.} = 1 \text{ rod (rd.)}$$
$$320 \text{ rd.} = 1 \text{ mile (mi.)}$$

2. My garden is 6 rd. wide and 10 rd. long. What will it cost to fence it at 50¢ per yard?

3. How many square yards in the garden described in Ex. 2?

4. What will a walk 1 yd. wide running along one side and one end of the same garden cost? The walk is outside the garden. Draw a diagram. A sq. yd. cost 50¢.

5. On a building lot 60 ft. wide and 110 ft. long is a house 32 ft. wide and 40 ft. long. How many square feet of lawn remain? Draw a diagram.

6. How long in feet is a square yard? How many square feet in a square yard?

7. How many square feet in a walk 125 feet long and 1⅓ yd. wide?

8. If your schoolroom is 27 ft. wide and 36 ft. long, how many square yards in the ceiling? What will the plastering cost at 27¢ per square yard?

9. How many square yards of carpeting will it take for a room 27 feet by 18 feet?

10. My flower bed is 36 feet long and ¼ as wide. How many square feet does it contain?

1. Divide 8008 by 26.

WORK

$$26)\overline{8008}(308$$
$$\underline{78}$$
$$208$$
$$\underline{208}$$

REMARK.—The partial dividend 20 is smaller than the divisor 26. So we put 0 in the quotient, annex 8 to the 20, and say 26 in 208, 8 times.

2. $3469 \div 62$. **9.** $8976 \div 92$. **16.** $550,112 \div 84$.

3. $8328 \div 73$. **10.** $3481 \div 83$. **17.** $404,201 \div 74$.

4. $5964 \div 82$. **11.** $5766 \div 74$. **18.** $40,121 \div 35$.

5. $42,022 \div 43$. **12.** $303,211 \div 73$. **19.** $443,121 \div 44$.

6. $42,202 \div 53$. **13.** $311,121 \div 83$. **20.** $13,496 \div 75$.

7. $42,200 \div 73$. **14.** $342,221 \div 94$. **21.** $73,942 \div 65$.

8. $40,220 \div 43$. **15.** $221,121 \div 103$. **22.** $96,847 \div 44$.
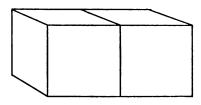
23. Divide 14,246 by 29.

WORK

$$29)\overline{14246}(491$$
$$\underline{116}$$
$$264$$
$$\underline{261}$$
$$36$$
$$\underline{29}$$
$$7 \text{ remains.}$$

REMARK. — Since the divisor is so near 30, we use 30 to find the quotient figure and say *"nearly* 3*"* in 14; *"nearly* 3*"* in 26, etc.

24. $46,446 \div 19$.

25. $86,466 \div 29$.

26. $24,246 \div 39$.

27. $86,644 \div 49$.

28. $64,246 \div 59$.

29. $51,535 \div 69$.

30. $35,353 \div 79$. **32.** $31,533 \div 99$. **34.** $96,548 \div 98$.

31. $33,353 \div 89$. **33.** $41,263 \div 48$. **35.** $76,324 \div 76$.
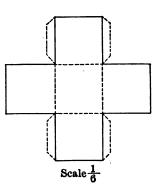
1. Sold a buggy for $126. This was $35.40 more than it cost. Find the cost.

2. Bought 16 acres of land at $135 per acre. Find the cost.

3. When butter is 28¢ per pound, what will 4½ pounds cost?

4. At 36 miles per hour, how far can a train run in 24 hours?

5. At 95¢ each, how much will 1½ dozen books cost?

6. What will ⅖ of a box of oranges cost at $5.35 per box?

7. If ¼ of a farm is worth $3250, what is ¾ of it worth?

8. When milk is 6¢ per quart, what must I pay for 5½ gallons?

9. When cranberries are 8¢ per quart, what is a barrel of 2½ bushels worth?

10. A man earns $2½ per day and pays 75¢ a day for his board. How much can he earn above his board in a week of 6 working days?

11. I paid $3.75 for ½ ton of coal. What is that per ton?

12. A barrel of flour weighs 196 pounds. After selling ¾ of a barrel, how many pounds are left?

13. Find the cost of 14 pounds of meat at 12½¢ per pound.

1. How many faces has a cube? What is the shape of each?

2. How many faces has the solid here shown? What is the shape of each?

3. What name is given to both squares and oblongs?
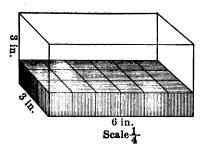
A solid whose faces are all rectangles is a **rectangular solid.**

4. How many **square inches** in the *surface* of the solid represented above? How many **cubic inches** in the *volume?*

5. Describe a 2-inch cube. How many square inches in each of its 6 faces? How many cubic inches in its volume?

6. Make from cardboard a box that will hold 8 cubic inches.

7. Make a plan for a box that will hold 12 cubic inches if it is to be 2 inches high. Make the box.

8. Draw a plan and make a 3-inch cube. What is its surface? How many 1-inch cubes will it contain? Make a box that will hold 24 inch cubes.

Scale $\frac{1}{6}$

1. How many cubic inches in the bottom layer of this rectangular solid? How many such layers?

Then there are 3×18 cubic inches in the whole solid, and we say the **volume** is 54 *cubic inches*.

3 in.

3 in.

6 in.
Scale $\frac{1}{4}$
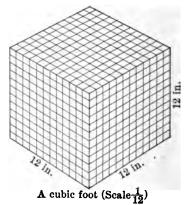
In finding the volume of a rectangular solid, first find the number of cubes in one layer, then the number of layers, and then the whole number of cubes.

2. How many cubic inches in one layer of a 12-inch cube? How many layers? Then how many cubic inches in a cubic foot?

1 cubic foot (cu. ft.) = 1728 cubic inches (cu. in.).

3. 2 cu. ft. = —— cu. in.

4. Suppose you should separate a cubic foot into halves, how many cubic inches in each half? In $\frac{1}{4}$ of a cubic foot how many cubic inches?

12 in.

12 in.   12 in.

A cubic foot (Scale $\frac{1}{12}$)

5. If you should divide a foot cube into 8 equal cubes, how many cubic inches would each one of them contain?

6. How many cubical blocks, each a foot long, would be needed for a pile 8 ft. long, 7 ft. wide, and 3 ft. high?

1. Find the number of cubic feet in a 3-foot cube or a **cubic yard.**
Remember the
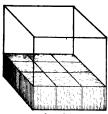
     Table for Solid Measure.
     1728 cubic inches = 1 cubic foot.
       27 cubic feet = 1 cubic yard (cu. yd.).

2. How many cubic inches in 18 cubic feet?

1 cubic yd.

3. How many cubic inches in 57 cubic feet?

4. How many cubic inches in a cubic yard?

5. How many cubic feet in 97 cubic yards?

6. How many cubic yards in 2425 cubic feet?

---

7. Find the number of cubic yards of soil removed from a cellar 9 feet deep, 12 feet wide, and 21 feet long.

8. Find the number of cubic yards of soil removed from a ditch 2 yards wide, 3 yards deep, and 320 yards long.

9. Compare a 1-foot cube with a 2-foot cube.

10. If a 1-foot cube of ice weighs 57 pounds, what will a 2-foot cube weigh?

11. Compare a 6-inch cube with a cubic foot. If a cubic foot of ice weighs 57 pounds, what will a 6-inch cube weigh?

1. Find one half of $476.84.   3. What is $\frac{1}{3}$ of $897.39?

2. Divide $386.28 by 4.   4. Find $\frac{1}{5}$ of $762.95.

5. What is one of the 6. equal parts of $6347.16?

6. How many times is $7 contained in $4976.37?

7. I lose $\frac{1}{8}$ of $2476.48. What have I left?

8. Divide $3468.25 among 9 men. What will each receive?

9. Find $\frac{1}{12}$ of 87,392 pounds.

10. What is $\frac{1}{12}$ of 64,872 months?

11. How many dozen in 100,000?

12. How much larger is $\frac{1}{10}$ of 4800 than $\frac{1}{11}$ of 3575?

Find the value of

13. $552,232 \div 54$.
14. $243,110 \div 64$.
15. $152,231 \div 74$.
16. $435,112 \div 84$.
17. $543,121 \div 94$.
18. $402,301 \div 95$.
19. $422,345 \div 55$.
20. $539,876 \div 56$.
21. $644,642 \div 63$.
22. $787,831 \div 76$.

23. $866,474 \div 48$.
24. $673,342 \div 58$.
25. $477,773 \div 68$.
26. $347,544 \div 78$.
27. $887,744 \div 89$.
28. $347,544 \div 89$.
29. $281,263 \div 88$.
30. $187,602 \div 89$.
31. $402,222 \div 53$.
32. $331,110 \div 63$.

33. $664,246 \div 55$.
34. $351,535 \div 75$.
35. $735,353 \div 65$.
36. $533,353 \div 85$.
37. $131,533 \div 95$.
38. $713,555 \div 96$.
39. $36,632 \div 29$.
40. $241,747 \div 39$.
41. $268,931 \div 59$.
42. $463,246 \div 79$.

1. There are 238 teachers in the schools of a city. If the number of pupils to each teacher averages 38, find the total enrollment.

2. A farmer raised 26 bushels of wheat per acre on 19 acres. What is it worth at 79∮ per bushel?

3. My garden is 38 feet wide and 72 feet long. How many square feet does it contain?

4. A farmer sold 68 sheep and 46 lambs. He got $5.60 each for the sheep and $3.95 each for the lambs. What did he get for all?

5. A man carried a load of 58 bushels of apples into his cellar with a 2-peck basket. How many trips did he make?

6. If a boy earns $3.75 per week selling papers and $2.50 more selling butter and eggs, what can he earn in 26 weeks?

7. When 9 pounds of tea are worth $4.86, what is that per pound? What will 18 pounds cost? Solve in two ways.

8. A farmer got $495 for 33 calves. What was that each?

9. If 1620 bushels of wheat are harvested from 45 acres, what is the average yield per acre? What could one expect from 9 acres of this crop? Solve the last part in a short way.

10. A piece of land that cost $785 was sold at a profit of $216. What was the selling price?

FRUITS

PEARS. — Best, $1.25 per bu.

APPLES. — Best, $2.25; fair grades, $1.50 per bbl.

PEACHES. — Good, $2 per bu.; fancy, $2.50 per bu.

GRAPES. — Concords, 25 ¢ per 10-lb. basket; Niagara, 25 ¢ per 10-lb. basket.

CRANBERRIES. — $6.75 per bbl.

LEMONS. — California, $4.50 per box.

FARM AND GARDEN

POTATOES. — Michigan, 55 ¢ per bu.

SWEET POTATOES. — Jersey, $1.40; Virginia, 85 ¢ per bu.

CHEESE. — Full cream, Michigan, 10½ ¢ per lb.

EGGS. — Regular receipts, 19 ¢; candled, 22½ ¢ per doz.

BUTTER. — State creamery, 22 ¢; extra dairy, 17 ¢ per lb.

VEGETABLES. — New carrots, 45 ¢ per bu.; celery, 25 ¢ per doz.

From the market report shown above, find the cost of the following : —

1. 365 bu. potatoes.

2. 12 cases, 30 doz. each, eggs, candled.

3. 378 10-lb. baskets Concord grapes.

4. 216 boxes California lemons.

5. 17 barrels cranberries.   7. 48 bbl. best apples.

6. 34 bu. peaches, fancy.   8. 53 bbl. apples, fair grade.

9. 17 barrels, 2½ bu. each, sweet potatoes, Virginia.

10. How much more would the same quantity of Jersey sweet potatoes cost?

11. 97 lb. extra dairy butter.   12. 54 bushels best pears.

13. 312 baskets of Niagara grapes.

14. 38 cases, 30 doz. each, eggs, regular receipts.

15. 19 full cream cheese, 14 lb. each.

16. 17 bu. new carrots and 36 doz. celery.

17. From quotations in your daily paper, find the cost of the articles named above.

1. How many square inches in the upper surface of a table 42 inches wide and 68 inches long?

2. How many square feet in the floor of your school-room?

3. How many cubic inches will a box 3 inches wide, 5 inches long, and 4 inches deep, contain?

4. How many square inches in the entire surface of a 4-inch cube?

5. How many square feet in a walk 72 feet long and 4 feet wide?

6. My building lot is 128 feet long and $\frac{1}{4}$ as wide. How many square feet does it contain?

7. I have a flower bed containing 64 square feet. How long is it?

8. How many feet around the lot described in Ex. 6?

9. How much will it cost to fence the same lot at a cost of 16 ⨍ per yard?

10. What will a 4-foot walk across one end of the same lot cost at 17 ⨍ per square foot?

11. How many cubic inches in a prism 9 inches wide, 14 inches long, and 17 inches high?

12. A bin is 9 feet wide, 13 feet long, and 4 feet deep. How many cubic feet will it hold?

13. If a cubic foot will hold $1\frac{1}{4}$ bushels, how many bushels will the bin described in Ex. 12 hold?

1. Compare 6 and 30 thus : 6 is $\frac{1}{5}$ of 30, 30 is 5 × 6.

In this way compare rapidly : —

2. 7 and 42.	12. 10 and 40.	22. 6 and 72.
3. 9 and 63.	13. 12 and 60.	23. 7 and 35.
4. 8 and 64.	14. 11 and 88.	24. 9 and 54.
5. 7 and 56.	15. 9 and 27.	25. 4 and 32.
6. 6 and 54.	16. 7 and 49.	26. 7 and 84.
7. 9 and 81.	17. 6 and 36.	27. 20 and 40.
8. 6 and 42.	18. 9 and 45.	28. 30 and 90.
9. 11 and 77.	19. 8 and 96.	29. 40 and 120.
10. 12 and 96.	20. 7 and 42.	30. 20 and 80.
11. 8 and 40.	21. 5 and 45.	31. 40 and 80.

Written
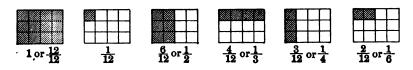
32. When 20 pounds of nails cost 80 ¢, what will 10 pounds cost ? What will 40 pounds cost ? (Compare 10 with 20, and 40 with 20.)

33. When 8 pounds of meat cost $1.20, what will 32 pounds cost ? What will 56 pounds cost ?

34. When 9 bushels of apples cost $10.25, what will 54 bushels cost ? What will 81 bushels cost ?

35. When 7 yards of ribbon cost 84 ¢, what will 21 yards cost ? What will 42 yards cost ?

36. When 8 yards of cloth cost $15.75, what will 40 yards cost ? What will 96 yards cost ?

37. When 9 tons of coal cost $73.50, what will 27 tons cost ? What will 63 tons cost ?

1. Compare 2 with $\frac{1}{2}$. If $\frac{1}{2}$ bu. of potatoes is worth 35¢, what are 2 bu. worth?

2. How many 4ths in 1? How many in 3? At $\frac{1}{4}$ bu. of peaches for 45¢, what will 3 bu. cost?

STATEMENT. — 12 × 45¢ = cost of 3 bu. How was the multiplier 12 obtained?

3. When 8 quarts of beans are worth $1.20, what is that per bushel?

4. What is the cost of $6\frac{1}{2}$ gal. of milk at 8¢ a quart?

5. If to make jelly requires a pound of sugar to a pint of juice, what will the sugar cost at 6¢ a pound to make up $1\frac{1}{2}$ gal. of juice?

6. If a pint will fill two jelly glasses, how many glasses will be needed for 8 quarts of jelly?

7. How many peck baskets can be filled from 648 quart boxes of currants?

8. A farmer raised 1000 bu. of oats. He sold 695 bushels; how many bushels does he keep? Give at sight.

9. A pound contains 16 ounces. How many pounds in 688 ounces?

10. How many ounces in 87 pounds?

11. A farmer feeds 16 bu. of corn daily to his hogs. How many days will 880 bushels last?

12. A merchant bought 3 tubs of dairy butter weighing as follows: $29\frac{1}{2}$ pounds; $32\frac{1}{2}$ pounds; 38 pounds. What did it cost at 23¢ per pound?

1. What are such numbers as $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{8}$, $\frac{7}{8}$ called?

2. What is meant by $\frac{1}{3}$ of an apple? $\frac{1}{5}$ of a cake?

3. Draw a circle. How many fourths in it? Erase $\frac{1}{4}$ of it. How many fourths remain? How do you write three fourths in figures?

1 or $\frac{12}{12}$ $\frac{1}{12}$ $\frac{6}{12}$ or $\frac{1}{2}$ $\frac{4}{12}$ or $\frac{1}{3}$ $\frac{3}{12}$ or $\frac{1}{4}$ $\frac{2}{12}$ or $\frac{1}{6}$

4. What parts of the whole oblongs are shaded?

5. Which is the largest part shaded? The smallest?

6. Compare $\frac{1}{3}$ of the oblong with $\frac{1}{2}$ of it. Which is the larger? How much larger? $\frac{1}{2} = \frac{6}{12}$; $\frac{1}{3} = \frac{4}{12}$; $\frac{6}{12} - \frac{4}{12}$ = ——.

7. Compare $\frac{1}{3}$ and $\frac{1}{4}$ in the same way. Compare $\frac{1}{3}$ and $\frac{1}{6}$.

8. How many numbers are required to express a fraction?

The two numbers needed to express a fraction are called its **terms.**

9. Into how many parts is the whole oblong divided in the illustration?

10. In the fraction $\frac{6}{12}$, which term shows this fact, 6 or 12? Which term shows the *name* of the parts?

11. In $\frac{6}{12}$ how many 12ths? Does the upper or lower term show this?

The lower term of a fraction shows into **how many** *equal parts the whole thing has been divided and thus names the equal parts, and is called the* **denominator.**

The upper term shows the **number** *of equal parts in a fraction, and is the* **numerator.**

1. Draw an oblong and divide it into halves.

2. Draw another and divide it into thirds.

3. In this way draw *fourths, sixths,* and *twelfths.*

4. In the last diagram you have drawn, show your teacher $\frac{1}{2}$ of it; $\frac{1}{3}$ of it; $\frac{1}{4}$ of it; $\frac{1}{6}$ of it; $\frac{1}{12}$ of it.

5. How many of the small squares, or 12ths, make $\frac{1}{2}$? How many make $\frac{1}{3}$? How many make $\frac{1}{4}$? $\frac{1}{6}$?

6. $\frac{1}{2} = \frac{?}{12}$; $\frac{1}{3} = \frac{?}{12}$; $\frac{1}{4} = \frac{?}{12}$; $\frac{1}{6} = \frac{?}{12}$.

7. Compare $\frac{1}{3}$ and $\frac{1}{12}$; $\frac{1}{3}$ and $\frac{1}{6}$; $\frac{1}{2}$ and $\frac{1}{12}$; $\frac{1}{4}$ and $\frac{1}{12}$.

8. Can you add *feet and inches* without changing to a *like unit;* that is, to units of the same size?

9. Before adding $\frac{1}{2}$ and $\frac{1}{4}$, we must think of the $\frac{1}{2}$ as —— fourths. $\frac{2}{4} + \frac{1}{4} = \frac{?}{4}$.

10. *Fractions whose denominators are alike are* **like fractions.** Are $\frac{5}{12}$ and $\frac{11}{12}$ like fractions? Are $\frac{1}{3}$ and $\frac{3}{4}$?

11. Add $\frac{1}{2}$ and $\frac{1}{12}$. **12.** Add $\frac{1}{4}$ and $\frac{1}{12}$. **13.** Add $\frac{1}{3}$ and $\frac{1}{12}$.

14. Which is larger, $\frac{1}{2}$ or $\frac{6}{12}$? Prove.

15. $\frac{2}{3}$ of 12 is ——; $\frac{2}{3}$ of a foot = —— in.; $\frac{8}{12}$ of a foot is —— in. Compare $\frac{2}{3}$ and $\frac{8}{12}$.

16. Compare $\frac{3}{4}$ and $\frac{9}{12}$. **17.** Compare $\frac{5}{6}$ and $\frac{10}{12}$.

$\frac{1}{2} = \frac{6}{12}$ $\frac{3}{4} = \frac{9}{12}$ $\frac{2}{3} = \frac{8}{12}$ $\frac{5}{6} = \frac{10}{12}$

1. Cut a strip of paper 1 ft. long into pieces 1 in. long.

2. How many pieces have you? What is meant by $\frac{1}{12}$ of a foot?

3. What is meant by $\frac{3}{12}$ of a foot? What does each term show? Name each term of $\frac{4}{12}$.

4. What part of a foot is 1 in.? 2 in.? 3 in.? 6 in.?

5. $\frac{2}{12} + \frac{3}{12} + \frac{5}{12} = ?$ **7.** $\frac{1}{12} + \frac{6}{12} + \frac{4}{12} = ?$

6. $\frac{2}{12} + \frac{7}{12} + \frac{3}{12} = ?$ **8.** $\frac{3}{8} + \frac{2}{8} + \frac{1}{8} = ?$

9. Add $\frac{1}{3} + \frac{1}{4}$. Since these are unlike things, they cannot be added without changing to some like unit. $\frac{1}{3} = \frac{?}{12}$; $\frac{1}{4} = \frac{?}{12}$; $\frac{4}{12} + \frac{3}{12} = \underline{\quad}$.

10. $\frac{1}{2} = \frac{?}{12}$.   **14.** $\frac{2}{3} = \frac{?}{12}$.   **18.** $\frac{1}{2} - \frac{1}{12}$.   **22.** $\frac{2}{3} - \frac{1}{12}$.

11. $\frac{1}{3} = \frac{?}{12}$.   **15.** $\frac{3}{4} = \frac{?}{12}$.   **19.** $\frac{1}{3} - \frac{1}{12}$.   **23.** $\frac{3}{4} - \frac{1}{12}$.

12. $\frac{1}{4} = \frac{?}{12}$.   **16.** $\frac{5}{6} = \frac{?}{12}$.   **20.** $\frac{1}{4} - \frac{1}{12}$.   **24.** $\frac{5}{6} - \frac{1}{12}$.

13. $\frac{1}{6} = \frac{?}{12}$.   **17.** $1 = \frac{?}{12}$.   **21.** $\frac{1}{6} - \frac{1}{12}$.   **25.** $\frac{1}{2} - \frac{1}{3}$.

26. $\frac{1}{2}$ ft. = —— inches; $\frac{3}{4}$ ft. = —— inches; $\frac{1}{2}$ ft. + $\frac{3}{4}$ ft. = —— inches.

27. 6 in. + 9 in. = —— inches; 15 in. = 1 ft. and —— inches.

28. $\frac{6}{12} + \frac{9}{12} = \frac{?}{12}$; $\frac{15}{12} = 1\frac{3}{12}$; $\frac{17}{12} = \underline{\quad}$.

29. $\frac{1}{2} + \frac{2}{3}$.   **31.** $\frac{2}{3} + \frac{3}{4}$.   **33.** $\frac{3}{4} + \frac{5}{6}$.   **35.** $\frac{1}{2} + \frac{1}{3}$.

30. $\frac{3}{4} + \frac{1}{2}$.   **32.** $\frac{2}{3} + \frac{5}{6}$.   **34.** $\frac{3}{4} + \frac{1}{3} + \frac{1}{2}$.   **36.** $\frac{2}{3} + \frac{7}{12}$.

1. If a family use 3 pt. of milk a day, how many quarts will they use during July and August?

2. What will a dozen oranges cost at 2 for 5¢?

3. At 20 lb. for $1, what will 10 lb. of sugar cost? What will 5 lb. cost? What will 15 lb. cost?

4. What will a peck of beans cost at $3.20 a bushel? What will ½ peck cost? What will a quart cost?

5. At 30¢ a dozen, what should you pay for 4 oranges? For 8 oranges?

6. A small family uses 2 oz. of coffee a day; how long will 6 pounds last?

7. At 16¢ a pound what will 1 pound and 8 ounces of meat cost? What will 1 oz. cost? 3 lb. 12 oz.?

8. A farmer bought 12 young cattle at $23 each, and 9 cows at $54 each. He gave in payment 19 tons of hay at $12, and the remainder in cash. How much cash did he pay?

9. At 30¢ per yard, find the cost of 3½ yards of ribbon.

10. At 80¢ per bushel, find the cost of 1 bu. 3 pecks of potatoes.

11. At $12 per ton, find tne cost of 7¾ tons of hay.

12. At $6 per cord, find the cost of 17½ cords of wood.

13. My dining room is 14 feet by 16 feet. In the center is a mat 9 feet by 12 feet. How many square feet of the floor are not covered? Make a drawing.

14. A man bought a farm for $3400, and paid ⅗ of it at the time. How much remained to be paid?

1. What is the smallest coin in our money?

2. What is the smallest silver coin? The largest?

3. $\frac{1}{10}$ of a dime = ——.   4. $\frac{1}{100}$ of a dollar = ——.

   $\frac{3}{10}$ of a dime = ——. $\frac{3}{100}$ of a dollar = ——.

   $\frac{1}{10}$ of a dollar = ——. $\frac{25}{100}$ of a dollar = ——.

   $\frac{4}{10}$ of a dollar = ——. $\frac{75}{100}$ of a dollar = ——.

5. 1 dime = $\frac{1}{?}$ of a dollar.   3 dimes = $\frac{3}{?}$ of a dollar.

6. 1 cent = $\frac{1}{?}$ of a dollar.   45 cents = $\frac{45}{?}$ of a dollar.

7. What is the common way of writing a number of dollars and cents? $1, 3 dimes, 7 cents, is written ——.

Dimes are written in the first place at the right of the decimal point as **tenths** *of a dollar, and cents in the second place as* **hundredths** *of a dollar.*

8. Do we mention the dimes in reading a sum of money? Read, 3\frac{43}{100}$, or $3.43.

9. Read as dimes and cents, and then as tenths and hundredths of a dollar: $0.45; $0.87; $0.54.

10. Read first as cents, and then as hundredths of a dollar.

11. $\frac{1}{10}$ of a cent is called a *mill*. How many mills make a cent? In 40 mills there are —— cents.

12. $\frac{1}{2}$ of a cent = —— mills. 2$\frac{1}{2}$ cents = $0.025, or 2¢ 5 mills.

Mills are written in the third decimal place as **thousandths** *of a dollar.*

13. Read: $4.375; $0.625; $0.063.

1. What does each 2 represent in 22 ?

2. How do they compare in value ?

3. In $44, what does each 4 represent? Compare their values.

4. In $3.33, tell what each represents as dollars, dimes, and cents. As dollars, tenths of a dollar, hundredths of a dollar.

5. As you move a figure one order to the right, how do you affect the value which it represents ?

6. What then should be the value of the number written in the first place at the right of *ones ?* The second place at the right ?

We use a **decimal point** *(.) to locate ones, and the first order at the right is* **tenths,** *and the second,* **hundredths.** Thus: 3.4 is read 3 and 4 tenths; 2.68 is read 2 and 68 hundredths. "And" is used between the whole number and the fraction.

Read : —

7.	6.7.	12.	0.63.	17.	3.4.	22.	9.09 miles.
8.	9.42.	13.	1.09.	18.	6.04 yd.	23.	11.11.
9.	8.53.	14.	10.1.	19.	7.4 gal.	24.	3.43.
10.	9.07.	15.	9.09.	20.	7.04 gal.	25.	0.05.
11.	0.8.	16.	9.9.	21.	0.95 miles.	26.	0.09.

Write : —
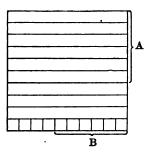
27. Three and four tenths. 28. Forty-five hundredths.

29. Nine and six hundredths. 30. Eleven hundredths.

1. Show your teacher 0.1 of this square; 0.3 of it; 0.5 of it.

2. Show 0.01 of it; 0.04 of it.

3. Show 0.36 of it; 0.4 of it.

4. Name the part in A. The part in B.

5. Make a line 0.1 of a foot long; 0.1 of a yard long.

Fractions whose denominators are 10, 100, *etc., may be written with a decimal point and are called* **decimals.**

Write as decimals : —

6. $\frac{3}{10}$.

7. $\frac{17}{100}$.

8. $\frac{45}{100}$.

9. $\frac{7}{10}$.

10. $3\frac{4}{10}$.

11. $5\frac{8}{10}$.

12. $6\frac{24}{100}$.

13. $7\frac{13}{10}$.

14. $9\frac{16}{100}$.

15. $4\frac{5}{100}$.

16. $7\frac{6}{10}$.

17. $8\frac{7}{100}$.

Written

1. Add 3.8, 7.5, and 6.45.

WORK

3.8
7.5
6.45
―――
17.75

REMARK. — Since only like things can be combined into one sum, we place the decimal points under each other so that the *ones* will come in one column, the *tenths* in another, etc.

2.	3.	4.	5.	6.
0.75 +	3.42 +	5.46 +	1.83 +	2.86 +
1.6	7.8	7.53	2.9	1.94
7.23	0.96	8.2	0.76	0.72
2.5	7.44	0.06	1.09	0.8

1.	2.	3.	4.	5.
3.46	5.73	6.82	9.81	8.03
−1.28	−2.9	−1.93	−3.67	−1.8

6. Subtract 3.28 from 5.6.

WORK

5.60
3.28
—
2.32

REMARK. — Since there are no hundredths in the minuend, we may fill its place with a zero and proceed as in any subtraction.

7. 3.46 from 7.8.   10. 16.45 from 23.8.

8. 9.13 from 15.7.   11. 14.37 from 29.

9. 6.93 from 9.3.   12. 15.64 from 38.

Multiplication of Decimals

13.	$7	7 ft.	7 miles	7 tenths	0.7	7 hun.
	3	3	3	3	3	3

14. Multiply 3.56 by 8.

WORK

3.56
8
—
28.48

REMARK. — Since 8 × 6 hundredths are 48 hundredths, or four tenths and 8 hundredths, the 8 is placed in hundredths' place and the 4 carried to the tenths' place.

Observe that when a decimal is multiplied by a whole number, the decimal point in the product comes under the decimal point of the multiplicand.

15.	3.86	5.48	6.93	14.8	16.9	48.9
	× 9	× 7	× 8	× 9	× 7	× 6

1. 4)$8   4)8 ft.   4)8 rods   4)8 tenths   4)0.8   4)0.08

2. Divide 0.98 by 8.

WORK

7)0.98
‾‾‾‾‾
0.14

REMARK. — 9 tenths divided by 7 is 1 tenth and 2 tenths remaining undivided. The 1 tenth is written in the quotient as tenths; that is, 0.1. The 2 tenths remaining make 20 hundredths, which with the 8 hundredths are 28 hundredths. 28 hundredths ÷ 7 is 4 hundredths, or 0.04. The quotient is 0.14.

Divide :—

3. 0.72 by 4.	**7.** 12.81 by 7.	**11.** 7.29 by 9.
4. 0.96 by 6.	**8.** 15.68 by 7.	**12.** 8.91 by 3.
5. 0.84 by 7.	**9.** 34.29 by 9.	**13.** 5.49 by 9.
6. 9.68 by 8.	**10.** 0.65 by 5.	**14.** 6.48 by 6.

Review in Decimals

15. Add 3.36, 2.41, 7.6, 9.43.   **18.** Multiply 34.8 by 13.

16. From 9.42 subtract 1.9.   **19.** Multiply 0.98 by 36.

17. Add 0.96, 7.3, 6.09, 8.41.   **20.** Divide 10.53 by 13.

WORK

0.81
13)10.53
10.4
‾‾‾‾
.13

REMARK. — Place each quotient figure over the right-hand figure of the number that was divided and keep the decimal point of the quotient over that of the dividend. Why?

21. 4.65 ÷ 15.	**24.** 38.75 ÷ 25.	**27.** 8.46 − 1.9.
22. 96.84 ÷ 17.	**25.** 38 × 9.64.	**28.** 9.3 − 4.96.
23. 3.84 ÷ 16.	**26.** 42 × 8.17.	**29.** 8.31 − 2.09.

1.	18,639 ÷ 53.	26.	967,865 by 49.
2.	28,466 ÷ 27.	27.	70,380 by 69.
3.	46,035 ÷ 58.	28.	58,761 by 59.
4.	27,321 ÷ 24.	29.	81,761 by 59.
5.	31,406 ÷ 34.	30.	136,878 by 39.
6.	86,644 ÷ 47.	31.	28,465 by 97.
7.	64,246 ÷ 67.	32.	146,287 by 77.
8.	131,533 ÷ 97.	33.	426,387 by 83.
9.	54,394 ÷ 43.	34.	596,242 by 78.
10.	40,095 ÷ 38.	35.	436,245 by 95.
11.	713,555 ÷ 87.	36.	846,791 by 85.
12.	131,533 ÷ 58.	37.	728,436 by 73.
13.	60,803 ÷ 85.	38.	678,391 by 68.
14.	694,830 ÷ 69.	39.	472,983 by 48.
15.	365,400 ÷ 57.	40.	872,702 by 89.
16.	296,068 ÷ 98.	41.	157,936 by 98.
17.	496,068 ÷ 86.	42.	289,876 by 125.
18.	39,416 ÷ 103.	43.	347,621 by 236.
19.	283,472 ÷ 113.	44.	456,932 by 381.
20.	619,842 ÷ 105.	45.	864,371 by 426.
21.	417,863 ÷ 121.	46.	698,428 by 573.
22.	519,831 ÷ 131.	47.	386,471 by 648.
23.	157,632 ÷ 143.	48.	694,328 by 901.
24.	328,931 ÷ 151.	49.	846,792 by 837.
25.	729,364 ÷ 162.	50.	983,735 by 762.

1. **If** I separate 25 cents into 5 *equal parts, how many cents* in each part? $\frac{1}{5}$ of 25 cents = —— cents.

2. If I separate 25 cents *into parts* of 5 cents each, *how many parts* will I have?   25 cents ÷ 5 cents = ——.

3. If I separate 28 cents into 4 equal parts, what is *the size of each part?*

4. Into *how many parts* of 4 cents each may I divide 28 cents?

5. When 36 inches is divided by 9 inches, what does the quotient show?   What shows the size of each part?

6. When 36 inches is divided by 9, what does the quotient show?   What does the divisor show?

Division then has two uses.

1st. *To find the* **size of one** *of the equal parts of the dividend.*

ILLUSTRATION. — What is $\frac{1}{8}$ of 72 cents?
Number of equal parts = 8)72 cents = money to be divided.
             9 cents = size of one part.

2d. *To find* **how many parts** *of a given size the dividend contains.*

ILLUSTRATION. — How many times is 9 cents contained in 72 cents?
Size of one of equal parts = 9 cents)72 cents = money to be divided.
             8   = number of equal parts.

Tell what each number shows.

7. 4)36 pounds   8. $5)$65   9. 6)42 ft.   10. 12 ft.)60 ft.
    9 pounds   13   7 ft.   5

11. 96 pears ÷ 12 pears = 8.   12. $\frac{1}{9}$ of 63 gal. is 7 gal.

Tell what the divisor and quotient show in each of the following : —

1. I have $4.75 to distribute among 9 boys. How much shall I give to each boy ?

EXPLANATION. — As there are 9 boys, each one will receive $\frac{1}{9}$ of $4.75, or $0.52, and 7 cents will be left undivided.

2. At $3 each, how many chairs can I buy for $40 ?

EXPLANATION. — I can buy as many chairs as $3 is contained times in $40; $3 in $40 13 times. Hence, I can buy 13 chairs, and I shall have $1 remaining.

3. How many men can you hire for $38, at $4 each ?

4. If a train of 23 cars carries 2000 tons, how many tons does each car carry ?

5. How many bushels of oats are there in 115 pecks ?

6. How many days are there in 208 hours ?

7. What is $\frac{1}{28}$ of $113.97 ?

8. In a certain city there are 6216 school children and 148 teachers. What is the average number to a teacher ?

9. How many boxes shall we need for 2000 blackboard crayons ? A gross, or 144, are put into a box.

10. Bought 127 tons of coal for $683.26. What was that a ton ?

11. Separate 7237 men into 97 companies.

12. How many yards in 10,000 inches of rope ?

13. How much remains after selling 17 tons of coal at $6.75 a ton, and buying as many coats as possible at $14 each with what is received ?

How many are: —

1. $\frac{5}{9}$ of 34,236?   6. $\frac{4}{9}$ of 69,372?   11. $\frac{2}{3}$ of 49,200?

2. $\frac{7}{9}$ of 53,127?   7. $\frac{4}{5}$ of 42,890?   12. $\frac{5}{6}$ of 12,594?

3. $\frac{3}{7}$ of 15,687?   8. $\frac{2}{7}$ of 72,849?   13. $\frac{4}{5}$ of 36,240?

4. $\frac{2}{11}$ of 120,087?   9. $\frac{3}{7}$ of 19,467?   14. $\frac{7}{12}$ of 72,624?

5. $\frac{4}{5}$ of 134,265?   10. $\frac{5}{9}$ of 43,632?   15. $\frac{5}{12}$ of 54,864?

How many times is: —

16. $34 contained in $32,572?

17. $63 contained in $93,840?

18. 29 feet contained in 35,278 feet?

19. 98 yards contained in 34,628 yd.?

What is: —

20. $\frac{1}{12}$ of 9837 yards?   23. $\frac{1}{98}$ of $3456.46?

21. $\frac{1}{32}$ of 4872?   24. $\frac{1}{25}$ of $3134.25?

22. $\frac{1}{52}$ of 8291 acres?   •   25. $\frac{1}{76}$ of $3728.00?

26. How many feet in 3962 inches?

27. How many inches in 3962 feet?

28. How many yards in 3962 feet?

29. How many feet in 3962 yards?

30. Add 37.6, 42.26, and 100.

31. From 396 take 200.44.

32. Find the product of 39.6 and 24.

33. Divide 89.59 by 17.

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*
1.	2	13	25	59	275	585	5482	14,578	264,032
2.	5	19	31	62	364	673	6947	25,657	589,175
3.	9	17	42	75	368	745	7601	69,765	368,439
4.	7	20	35	86	409	884	8379	41,980	898,764
5.	11	15	49	97	297	579	9846	73,693	440,832
6.	4	21	27	79	497	981	6912	39,816	793,761
7.	8	18	58	98	365	792	8046	92,724	889,476
8.	6	14	33	76	587	653	9367	56,539	695,749
9.	12	22	29	47	695	879	7896	87,835	786,530
10.	3	16	67	99	473	987	5843	78,454	929,763

NOTE. — The direction "find the product of $a \times b$" means that each number in column b is to be multiplied by the number on the same line with it in column a. Each direction furnishes ten examples. As many may be given as are needful.

Find the product of : —

1. $a \times g$.
2. $a \times h$.
3. $a \times i$.
4. $b \times c$.
5. $c \times d$.
6. $b \times f$.
7. $c \times e$.
8. $d \times f$.
9. $e \times f$.
10. $c \times g$.
11. $d \times g$.
12. $e \times g$.

Find the quotient of : —

1. $g \div a$.
2. $i \div a$.
3. $e \div b$.
4. $g \div d$.
5. $h \div d$.
6. $h \div c$.
7. $i \div d$.
8. $g \div f$.
9. $h \div f$.
10. $h \div e$.
11. $i \div f$.
12. $i \div g$.

1. $\frac{1}{6}$ of $42 + \frac{1}{5}$ of 40 ?   6. $\frac{3}{5}$ of $20 \div \frac{1}{4}$ of 12 ?

2. $\frac{2}{6}$ of $42 - \frac{1}{5}$ of 30 ?   7. $\frac{3}{8}$ of $72 \div \frac{1}{2}$ of 18 ?

3. $\frac{4}{5}$ of $30 + \frac{1}{8}$ of 32 ?   8. $\frac{7}{10}$ of $100 + \frac{1}{9}$ of 63 ?

4. $\frac{1}{2}$ of $24 \times \frac{1}{7}$ of 35 ?   9. $\frac{3}{4}$ of $48 - \frac{2}{7}$ of 21 ?

5. $\frac{5}{8}$ of $64 - \frac{1}{3}$ of 27 ?   10. $\frac{1}{9}$ of $81 \times \frac{1}{5}$ of 40 ?

21 is the product of 3×7; 3 and 7 are the factors of 21.

What are the factors of : —

1. 16, 18, 20, 24.   6. 88, 63, 108, 50.

2. 32, 48, 36, 35.   7. 16, 25, 36, 49.

3. 15, 45, 56, 64.   8. 64, 81, 63, 66.

4. 72, 42, 77, 84.   9. 70, 72, 96, 55.

5. 28, 33, 54, 27.   10. 28, 99, 48, 100.

Written.   *Find the missing number :* —

1. $642 + ? = 815.$ 6. $6 \times ? \times 7 = 2100.$

2. $48 \times ? = 1728.$ 7. $? \div 17 = 1615.$

3. $764 - ? = 348.$ 8. $48 + 95 + ? = 269.$

4. $6417 \div ? = 713.$ 9. $123 \times ? = \frac{1}{2}$ of 3690.

5. $2425 = \frac{1}{2}$ of ?   10. $\frac{2}{3}$ of $450 = 6 \times ?.$

Find : —

1. $\frac{2}{3}$ of 792.   6. $12\frac{1}{2} \times 184.$ 11. $7\frac{4}{5}$ hr. $= ?$ min.

2. $\frac{3}{4}$ of 1728.   7. $6\frac{3}{4} \times 980.$ 12. 1728 in. $= ?$ yd.

3. $\frac{5}{6}$ of 3348.   8. $15\frac{1}{10} \times 680.$ 13. $14\frac{7}{16}$ lb. $= ?$ oz.

4. $\frac{7}{8}$ of 1000.   9. $\frac{4}{15}$ of 630.   14. 24 rd. $= ?$ ft.

5. $\frac{8}{9}$ of 3465.   10. $2\frac{7}{8} \times 128.$ 15. 365 da. $= ?$ wk.

Add	*Subtract*	*Add*
1. $2\frac{1}{4}+1\frac{1}{2}+5\frac{1}{4}$.	6. $14-7\frac{1}{2}$.	11. $\frac{1}{6}+\frac{1}{3}$.
2. $3\frac{3}{4}+5\frac{1}{2}+6\frac{3}{4}$.	7. $16-1\frac{2}{3}$.	12. $\frac{2}{3}+\frac{5}{6}$.
3. $5\frac{1}{2}+6\frac{3}{4}+7\frac{1}{2}$.	8. $15\frac{3}{4}-9\frac{1}{2}$.	13. $\frac{1}{12}+\frac{2}{3}$.
4. $\frac{4}{8}+\frac{5}{8}+\frac{1}{2}+\frac{3}{8}$.	9. $\frac{7}{8}-\frac{3}{4}$.	14. $6\frac{1}{2}+6\frac{3}{4}$.
5. $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{3}{4}$.	10. $4\frac{7}{8}-1\frac{1}{2}$.	15. $\frac{5}{6}+\frac{1}{4}$.

1.	2.	3.	4.	5.
$6\frac{1}{2}$	$15\frac{1}{3}$	$12\frac{1}{2}$	$16\frac{7}{8}$	$4\frac{1}{5}$
$5\frac{1}{4}$	$23\frac{3}{4}$	$14\frac{1}{4}$	$24\frac{5}{8}$	$16\frac{3}{10}$
$7\frac{3}{4}$	$8\frac{1}{6}$	$20\frac{1}{8}$	$40\frac{1}{2}$	$14\frac{1}{2}$
$8\frac{1}{2}$	$19\frac{1}{12}$	$30\frac{7}{8}$	$18\frac{3}{4}$	$20\frac{7}{10}$

Give differences rapidly : —

1. $100-37$.	6. $10-2\frac{1}{2}$.	11. $\frac{1}{2}-\frac{1}{8}$.	16. $84-69$.
2. $100-84$.	7. $10-3\frac{1}{3}$.	12. $\frac{3}{4}-\frac{1}{8}$.	17. $75-16$.
3. $100-56$.	8. $10-5\frac{1}{4}$.	13. $\frac{1}{3}-\frac{1}{6}$.	18. $72-48$.
4. $100-28$.	9. $10-3\frac{7}{8}$.	14. $1\frac{1}{6}-\frac{5}{6}$.	19. $64-18$.
5. $100-79$.	10. $10-4\frac{3}{4}$.	15. $\frac{1}{3}-\frac{1}{4}$.	20. $96-37$.

Practice until you can give products quickly : —

1.	2.	3.	4.	5.	6.
2×13	2×14	2×15	2×16	2×17	2×18
3×13	3×14	3×15	3×16	3×17	3×18
4×13	4×14	4×15	4×16	4×17	4×18
5×13	5×14	5×15	5×16	5×17	5×18
6×13	6×14	6×15	6×16	6×17	6×18

1. $\frac{1}{6}$ of Tom's age is 3 years. How old is he?

2. How many minutes in $\frac{2}{5}$ of an hour?

3. 6 times Ned's money is 84 cents. How much has he?

4. What will a peck of cranberries cost at 9 cents a quart?

5. A tank with 6 gallons of oil in it is $\frac{1}{3}$ full. How many gallons does the tank hold?

6. Grace has written $\frac{1}{4}$ of her words and still has 18 more to write. How many has she already written?

7. It is 27 minutes after 3 o'clock. How many minutes before 4 is it?

8. What will 5 doz. eggs cost at 2 cents each?

9. What is the price for a day's board at $3.50 for a week?

10. How many inches in $\frac{1}{2}$ a yard?

11. A young man pays $8 a month for the rent of his room. What is this a year?

12. Take $\frac{2}{3}$ of 24 from $\frac{1}{2}$ of 60.

Find the cost of: —

13. 15 oranges when 5 oranges cost $0.12.

14. 9 yards of cloth when 7 yards cost $28.

15. 12 pounds of sugar when 8 pounds cost $1.

16. $7\frac{1}{2}$ quarts of milk if 5 quarts cost $0.40.

17. 27 lemons at $0.36 a dozen.

18. 8 photographs at $3 a dozen.

1. 576, 329, and another number added together make 1524. What is the other number?

2. What number shall I add to 650 to make 2000?

3. 6 times a number is 4752. What is the number?

4. What number shall I divide by 8 to get a quotient of 401?

5. How many tons of hay can be bought for \$1958 at \$22 a ton?

6. If 4950 pounds of cotton can be raised from an acre, how many pounds will 86 acres produce?

7. Add the product of 84 and 208 to their sum.

8. My garden is 120 feet long and 40 feet wide. What is the distance around it?

9. What will pay for
     6 lb. rice at 7 cents,
     20 lb. sugar at 5 lb. for a quarter,
     1 pk. potatoes at 80 cents a bushel?

10. Cyrus earned 36 cents every day in the week but Friday, when he lost 15 cents. How much did he have Saturday night?

11. A clerk has a salary of \$42 a month, and his expenses are \$27 a month. How many years will it take him to lay up \$900?

12. A butcher sold a quarter of beef weighing 285 pounds for \$62.70 at a gain of 3 cents a pound. What did a pound cost him?

Compare : —

1. 1 in. and 1 ft.
2. 1 ft. and 1 yd.
3. 1 hr. and 1 min.
4. 1 yr. and 1 mo.
5. 1 da. and 1 hr.
6. $1 and $0.10.
7. 1 qt. and 1 pk.

8. 1 bu. and 1 qt.
9. 1 gal. and 1 pt.
10. 1 yd. and 1 in.
11. $1 and $0.25.
12. $1 and $0.50.
13. $1 and $0.75.
14. 1 lb. and 1 oz.

Add : —

1. 5 lb. and 112 oz.
2. 15 gal. and 200 qt.
3. 6 yd. and 108 in.
4. 5 hr. and 420 min.
5. 16 bu. and 288 qt.

6. 2 yd. 24 ft. and 144 in.
7. 63 da. 96 hr. and 7 wk.
8. 200 lb. 7 T. and 1600 oz.
9. 94 gal. 840 qt. and 120 pt.
10. $$\frac{3}{4}$, 2\frac{1}{2}$, and 60 dimes.

Surface or Square Measure

144 square inches (sq. in.) = 1 square foot (sq. ft.)
  9 square feet   = 1 square yard (sq. yd.)

Solid or Cubic Measure

1728 cubic inches (cu. in.) = 1 cubic foot (cu. ft.)
  27 cubic feet   = 1 cubic yard (cu. yd.)

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